

Expert Report of Marc Glass

Massac County, Metropolis, Illinois

City of Metropolis, Illinois, a Municipal Corporation, and County of
Massac, a Municipal Corporation, v.
Honeywell International, Inc.

Case No. 3:21-cv-00860

On behalf of the Plaintiff and submitted to:

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September 26, 2023

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1. INTRODUCTION

The following presents my expert report in the matter of the City of Metropolis, Illinois and the County of Massac v. Honeywell International, Inc. I have been retained by Kevin Thompson, Esq. of the Thompson Barney Law Firm on behalf of the plaintiffs to present the results of a field sampling program in which I directly participated beginning on April 24, 2018 and continuing in several phases through July 26, 2023.

The Honeywell Metropolis Works, Inc. (“MTW”) plant is located at 2768 N U.S. Route 45 in Metropolis, Illinois (Enercon, 2021) as shown on (Figure 1). The sampling program investigated various environmental media, primarily interior settled dust and exterior soils at public and private properties in the community surrounding the Honeywell MTW plant for impacts from airborne radiological emissions originating from the plant.

I have also been retained to provide cost estimates for further site assessment sampling in the proposed Class Area impacted by radiological emissions from the Honeywell MTW plant.

Opinions presented herein are my own and based on the data and facts available to me at this time, as well as my involvement in matters, including legal cases, involving assessment and cleanup of environmental releases over large areas from commercial and industrial facilities. Should additional information become available, I reserve the right to supplement the opinions expressed in my report.

1.1 Federal Rules of Civil Procedure

The following is a list of the items required by the Federal Rules of Civil Procedure:

1. This report contains my opinions, conclusions and the reasons, therefore.
2. I do not have any exhibits to be used in summary of, or support for, my opinions with this report other than what is provided with this report and other reports submitted in this action.
3. A statement of my qualifications is contained in Appendix A and my CV is contained in Appendix B.
4. A list of publications I authored within the last ten years is shown in Appendix A.
5. My compensation for the preparation of this report and my testimony is included in Appendix A.
6. A statement of my previous testimony within the preceding four years as an expert at trial or by deposition is contained in Appendix A.
7. The documents cited in the body of this report, as well as the documents presented in the references section list the information I considered in forming my opinions.

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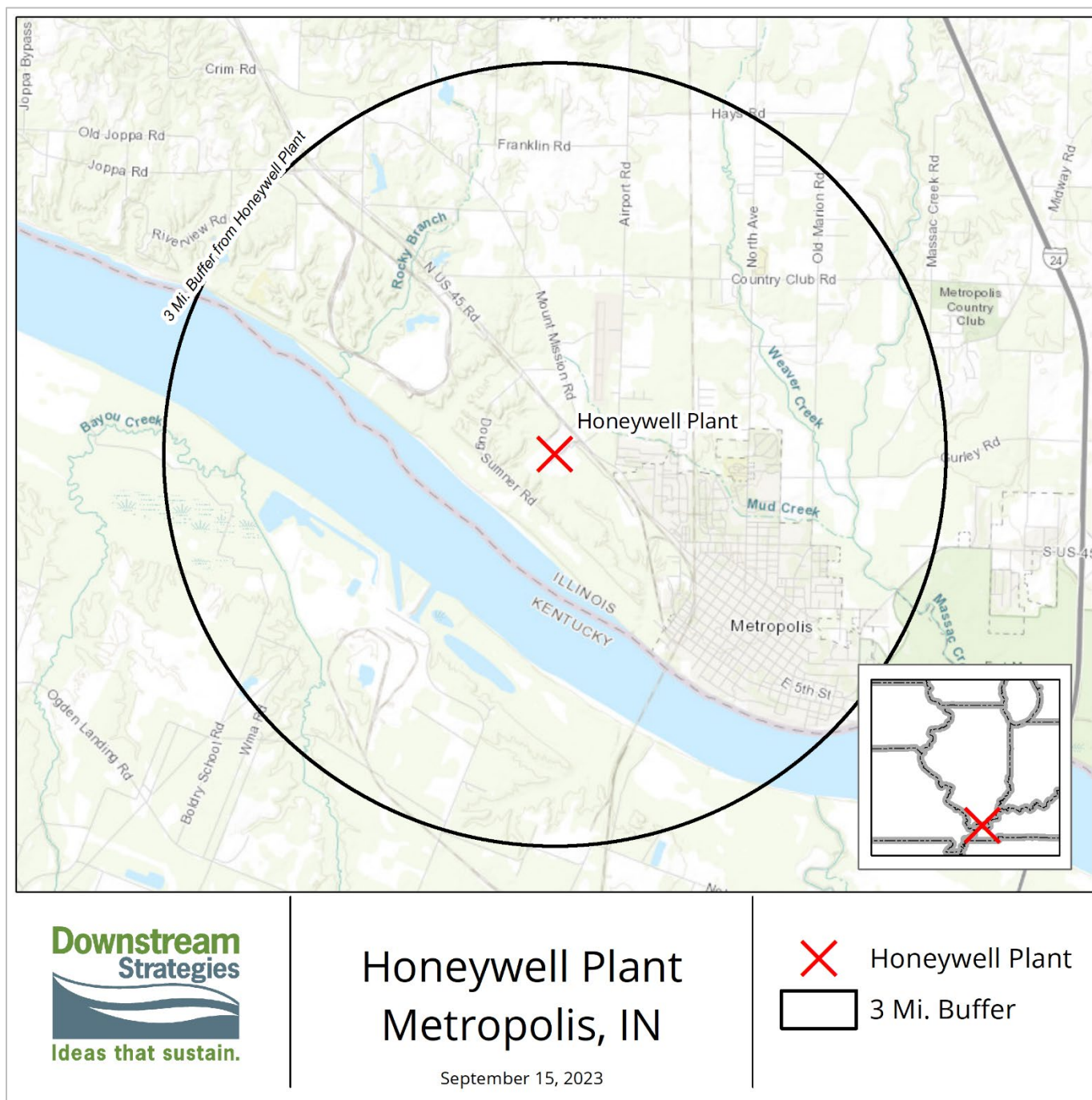
1.2 Summary of opinions

My opinions and findings in this matter are summarized below:

1. I personally visited properties within Metropolis and Massac County to perform site inspections and sampling during seven multi-day trips beginning in April 2018 and continuing through July 2023, including City of Metropolis and Massac County-owned parcels.
2. It is my opinion that radioactive particulate emissions from the Honeywell MTW facility have been released and reached human receptors in the City of Metropolis and Massac County at levels that present a likelihood to exceed acceptable health risk-based criteria.
3. A complete site characterization is needed to evaluate the necessity and extent of remediation on a property-by-property basis for City of Metropolis and Massac County-owned parcels.
4. I have provided my opinion for the design of a site characterization program for City of Metropolis and Massac County-owned parcels.
5. My opinion of the probable cost to implement the proposed site characterization program for City of Metropolis and Massac County-owned parcels is **\$11,098,225.28**.
6. It is my opinion that, more likely than not, remediation and confirmatory sampling will be necessary for some City of Metropolis and Massac County-owned properties to bring them into attainment of site-specific remedial goals established through the site characterization program. It is my opinion that it is impossible to predict costs related to the remediation without the benefit of the site characterization program.
7. It is my opinion that if release of radioactive particulates from the re-started Honeywell MTW are not reduced or contained that the process of site characterization and remediation will again be necessary in the future.
8. It is my opinion that the existing monitoring systems at Honeywell MTW have not been effective at detecting the release of airborne radioactive particulates and that a more effective system is necessary to prevent future contamination of City and County-owned properties.

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Figure 1: Site Location Map



1.3 Investigator background

I am a Principal and Senior Scientist at Downstream Strategies, LLC (DS), a Morgantown, West Virginia-based environmental consulting firm, at which I direct the environmental monitoring and remediation program. I am a West Virginia Department of Environmental (WVDEP) Protection Licensed Remediation Specialist (No. 175), with over twenty-three years of direct experience in conducting environmental investigation, site assessment, and cleanup of environmental releases at sites in Texas, West Virginia, Pennsylvania, and several other mid-Atlantic states. I have been

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retained by numerous public and private clients where my expertise has been utilized for site assessment, data review and interpretation, and implementation of risk-based remediation. I have managed site investigation and cleanup projects dealing with heavy metals, petroleum hydrocarbons, dense non-aqueous phase liquids (DNAPLs), light non-aqueous phase liquids (LNAPLs), polychlorinated biphenyls (PCBs), various chlorinated solvents, and other hazardous substances. From 2011 through 2017, I served as the court-appointed remediation technical expert for a class action settlement resulting from airborne particulates contaminated with heavy metals from a former zinc smelter in West Virginia, where exterior soil and interior dust remediation was performed over a 35-square mile area.

From 2018 through 2023 I have personally conducted seven multi-day trips to Metropolis and the surrounding areas in Massac County. I have personally inspected and performed sample collection at multiple public and private properties throughout the city and county, as well as the Honeywell MTW plant property. My CV is included as Appendix B.

In forming my opinions, I relied on my experience, personal observations, measurements collected by myself and others, and analytical data provided by qualified third-party laboratories. I have also reviewed literature sources cited in this report.

2. BACKGROUND

2.1 Site location

The City of Metropolis is located along the Ohio River within Massac County near the southern tip of Illinois. The Honeywell Metropolis Works (“MTW”) plant is owned by Honeywell International, Inc. (NRC, 2019) and sited on approximately 1,000-acres of land at the southern tip of Massac County, approximately 1.8 miles northwest of downtown Metropolis, Illinois. (Figure 1).

The MTW plant is addressed as 2768 N U.S. Route 45, Metropolis, Illinois and bound to the north by U.S. Highway 45 and the Ohio River to the south. Private residential areas are present to the northwest along Doug Sumner Lane, with an industrial coal terminal further to the west. Land uses north of U.S. Highway 45 and east include a mixture of residential, light commercial, and agricultural lands. The Metropolis Municipal Airport is located approximately 1-mile north-northeast of the MTW plant.

2.2 Honeywell MTW operational history

The MTW plant was constructed in 1958 to convert uranium ore concentrates into uranium hexafluoride (UF₆). UF₆ is then supplied to others for further enrichment of the Uranium-235 (U-235) isotope.

Uranium ore feedstocks (“yellowcake”) are reported to contain approximately 75 percent uranium, which when refined through Honeywell’s fluoride volatility process produces a high purity gaseous UF₆ concentrate with impurities of less than 300 parts per million (ppm). (Enercon, 2016).

The MTW plant processing capacity has been increased several times and currently has the capability of converting up to 15,000 metric tons of concentrated uranium ore per year (NRC, 2019). Throughout its history, the MTW plant has undergone several phases of plant idling, decommissioning operations, upgrades, and restarting of production activities (Enercon, 2021).

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In 2018, the Honeywell MTW plant was placed in a ready idle state. In 2021, Honeywell began the process of returning the plant to normal operations, which resumed in late spring 2023. (IEMA, 2021; NRC, 2023a, 2023b).

2.3 Honeywell MTW facilities and site features

The main Honeywell plant operations are contained within a 59-acre fenced enclosure in the north central portion of the 1,000-acre MTW plant property. Honeywell also owns approximately 100-acres directly across U.S. Highway 45 and south of the Metropolis airport (Enercon, 2021). This 100-acres includes multiple properties that were acquired by Honeywell, then Allied Chemical, as an “as low as reasonably achievable” (ALARA) project to better manage potential exposure in areas north and east of the main MTW entrance gate (NRCPDR002124, NRCPDR002180). A rail line parallels U.S. Highway 45 with a spur servicing the MTW plant.

All MTW process, support, storage, treatment buildings and facilities are located within the 59-acre restricted/fenced perimeter. Primary MTW process buildings include the feed materials building (FMB) and associated pads, wet process/sodium removal building, potassium hydroxide muds building, and sampling plant. Support facilities include over a dozen additional buildings for the storage, handling, and processing of uranium ores and process chemicals. Additional support facilities include five ore storage pads, hazardous waste storage buildings, UF6 cylinder storage area, wastewater treatment plant, uranium settling ponds, and calcium fluoride ponds (NRC, 2019).

2.4 MTW environmental releases

There are numerous known sources at the Honeywell MTW plant that, by design, release radioactive gas and particulates into the surrounding environment when the plant is operational. Among these are 53 individual stacks and exhaust fans (Enercon, 2021).

The largest of these stacks is prominent and conspicuously visible from U.S. Highway 45 as shown below in Exhibit 1.

Exhibit 1 : Honeywell MTW plant



South facing view of Honeywell MTW plant from U.S. Highway 45. Central emissions stack in center of view. Windsock and American flag demonstrate prevailing winds from the southwest.

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During a 2022 site inspection, I personally viewed exhaust fans from within the Feed Materials Building (FMB) located within the restricted area of the Honeywell MTW facility. The fans, located on the third story of the structure, vented directly to the exterior atmosphere, covered only partially by articulating louvre slats. Photographs of the fan installations on the third floor of the FMB are presented below in Exhibit 2. As can be seen from the accumulated dust-like material on the fan shrouds, these fans are visually obvious particulate emission sources into the atmosphere near Metropolis and Massac County.

Exhibit 2: FMB 3rd Floor Exhaust Fan to Exterior



Bulk accumulated dust on fan shroud on the 3rd Floor of FMB. This fan exhausts from the interior of the FMB through a louvre system directly to the ambient exterior atmosphere. Sample locations MET0530D, MET0531D, MET0532D.



Exterior exhausting fan on west wall of FMB. Sample locations MET0533D, MET0534D.

Liquid low-level radioactive waste has also been treated and discharged through an unlined drainage channel into the Ohio River. These radioactive discharge point sources are monitored by MTW personnel with limitations set by Clean Air Act and National Pollution Discharge Elimination System (NPDES) permits, respectively. Further ambient environmental monitoring is conducted through a series of on and off-site air, soil, surface water, sediment, radiation, and vegetation monitoring stations overseen by the Illinois Emergency Management Agency (IEMA).

Despite these monitoring programs and permit-based limitations on radioactive discharges, radioactive contaminants are nonetheless released through both known “routine” releases and accidental releases (IEMA-OHS, 2023; 2014). Further releases occur during transportation and handling of process materials and ores, products such as UF₆, and the thousands of cubic yards of low-level radioactive waste materials generated per year when the plant is operating (NRC, 2019).

This is evidenced through prior decommissioning activities and site assessments at the Honeywell MTW plant that have identified widespread contamination of the MTW plant buildings and non-plant areas (Enercon, 2021). Uranium isotopes U-234, U-235, U-238; Radium-226 (Ra-226); and Thorium isotopes Th-230 and Th-232 have been identified as the Radionuclides of Concern based on their greatest contributions to dose exposure, but this list is by no means exclusive.

As of 2021, radiologically contaminated soils delineated during a 2009 Radiological Characterization report remained at the MTW site. These included 2,718,692 cubic feet of soil from plant areas, 110,194 cubic feet of soil from non-plant areas, and 129,622 cubic feet adjacent to subsurface

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pipng runs. To restore an unrestricted use condition under 10 CFR 20.140, this soil needed to be removed from the Honeywell MTW (Enercon, 2021).

The 2021 Decommissioning Cost Estimate also determined that the entire FMB structure, concrete slab, building pads, and all equipment contained within were contaminated and in need of removal. After removal of the building and slab, contaminated soil was to be removed to a depth of 3-feet below grade. Nine other main production buildings and six production support buildings, and all equipment they contained were also determined to be contaminated. Numerous other drum storage pads, process ponds, the entire sanitary system, the entire process system, portions of the stormwater system, and outdoor discharge ditch to the Ohio River were determined to be contaminated.

Four additional contaminated areas on the Honeywell MTW property lying outside the restricted area included the Ore Storage Pads, the road to the inactive landfill, the landfill, and an approximately 37,500 square foot area along River Road. The Landfill and Kickback area consists of 38-acres nearer the eastern Honeywell MTW property boundary, much closer to Metropolis, which includes an inactive landfill used by Honeywell for subsurface disposal from 1950s through the mid-1980s (Enercon, 2021).

I have also personally inspected and collected samples from the Crowhill Property, an off-site location where calcium fluoride (CaF) recovered by Honeywell after use in the on-site Honeywell MTW wastewater treatment processes was stored. The Crowhill property is also located along North U.S. 45 Road, in Massac County, approximately nine miles northwest of Metropolis. The Crowhill site is an industrial/commercial property situated in a primarily rural setting, surrounded to the north, west, and east by actively farmed agricultural croplands and a woodlot. The Mermet Lake Conservation Area, including Mermet Lake and associated wetland areas, is located directly to the west across U.S 45 Road.

I collected bulk material samples of the CaF material stored at Crowhill in conditions totally open to the atmosphere and natural weathering processes. Exhibit 3 presents images for the storage of CaF materials both outdoors, and within a dilapidated storage building.

Exhibit 3: Uranium contaminated CaF stored outdoors off-site.



West facing view into the dilapidated Crowhill Property building where reclaimed CaF was stored in conditions open to the atmosphere.



Failing or missing structural supports and accumulated precipitation intermixed with bulk spent CaF material on floor. Building has missing roof sections

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North facing view of dilapidated Crowhill Property storage building from U.S. Highway 45.



View of CaF material erosion transport onto adjacent agricultural soybean field.

I collected multiple samples of the stored CaF material and soil on the Crowhill Property. As shown in Table 1, very high levels of uranium isotopes were observed in white-gray colored CaF material samples (-BS01, -BS02, -BS04). Similarly high uranium isotope activities were also noted in the Crowhill property soil samples -SS05 and -SS09 collected from near the north fence-line and the roadside drainage swale along the south property boundary. These results indicate that stored CaF bulk material has migrated to off-site receptors via weathering processes, whether by translocation of airborne particulates or mass transport via erosion.

Table 1: Uranium concentrations for soil and CaF material at Crowhill Property

Sample ID/depth	RES	UNC	RES	UNC	RES	UNC
	U-234	U-234	U-235	U-235	U-238	U-238
CHP-SS01 (0-6)	3.08	0.46	0.35	0.15	3.16	0.46
CHP-SS02 (0-6)	2.55	0.42	0.21	0.12	2.98	0.47
CHP-SS03 (0-6)	2.24	0.43	0.23	0.14	2.45	0.45
CHP-SS04 (0-6)	4.99	0.65	0.28	0.13	5.78	0.72
CHP-SS05 (0-6)	102.83	13.70	5.68	1.19	107.66	14.32
CHP-SS06 (0-6)	2.82	0.44	0.30	0.14	3.19	0.48
CHP-SS07 (16-18)	1.58	0.31	0.09	0.07	1.71	0.32
CHP-SS08 (0-6)	2.00	0.36	0.21	0.12	1.84	0.35
CHP-SS09 (0-6)	57.91	6.16	5.01	0.84	59.43	6.31
CHP-SS10 (0-6)	1.21	0.27	0.18	0.11	1.43	0.30
CHP-BS01	75.62	9.08	5.89	1.10	74.81	8.99
CHP-BS02	107.63	13.66	7.51	1.40	116.99	14.81
CHP-BS03	0.39	0.14	0.10	0.08	0.23	0.11
CHP-BS04	80.25	10.10	4.29	0.93	78.72	9.92

Source: Marc Glass Trip Report Summary. Crowhill Property. Massac County, Metropolis, Illinois. February 3, 2023. Notes: Results presented in pCi/g. RES=reported activity result. UNC=measurement uncertainty. Data summarized from Eberline Services, Inc. Internal Work Orders: 22-03100 and 22-03101. Sample depths provided in inches below ground surface, where applicable.

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Collectively, there is substantial body of undisputed evidence of both intentional and accidental releases of radioactive material from the Honeywell MTW facility into the environment near Metropolis and within Massac County. To identify if Honeywell MTWs radiological releases had impacted residential, commercial, and public receptors above natural background conditions, I and other plaintiff experts conducted a sampling program.

3. PROPERTY SAMPLING

I personally visited properties within Metropolis and Massac County on seven multi-day trips beginning in April 2018 and continuing through July 2023. The specific dates and general areas and types of properties I visited or collected samples from are presented below in Table 2.

Table 2: Property inspection and sampling events

Date	Areas visited/sampled
April 23-25, 2018	City-owned properties/buildings, private residences
October 9-11, 2018	Private residences, Mermet Swamp Nature Preserve
September 4-6, 2019	Private residences in Metropolis and Massac County, Mermet Swamp Nature Preserve, Fort Massac State Park
December 3-4, 2019	Honeywell MTW Plant inspection and sampling, north and south of U.S. Route 45
March 2, 2022	Honeywell-owned Crowhill Property inspection and sampling
February 6-8, 2023	City and County parks, Massac Memorial Hospital, Massac County Courthouse, Massac County Fairgrounds, private residences
July 24-26, 2023	City of Metropolis Airport, private residences and businesses, Crowhill/Honeywell CaF material sampling

As noted above, during these visits I conducted visual inspection and collected soil and settled dust samples from private residential yards and home interiors; businesses; City and County owned public buildings; City and County-owned parks and recreational facilities; Massac Memorial hospital, and the Metropolis municipal airport. Other plaintiff experts also conducted separate site reconnaissance and sampling events.

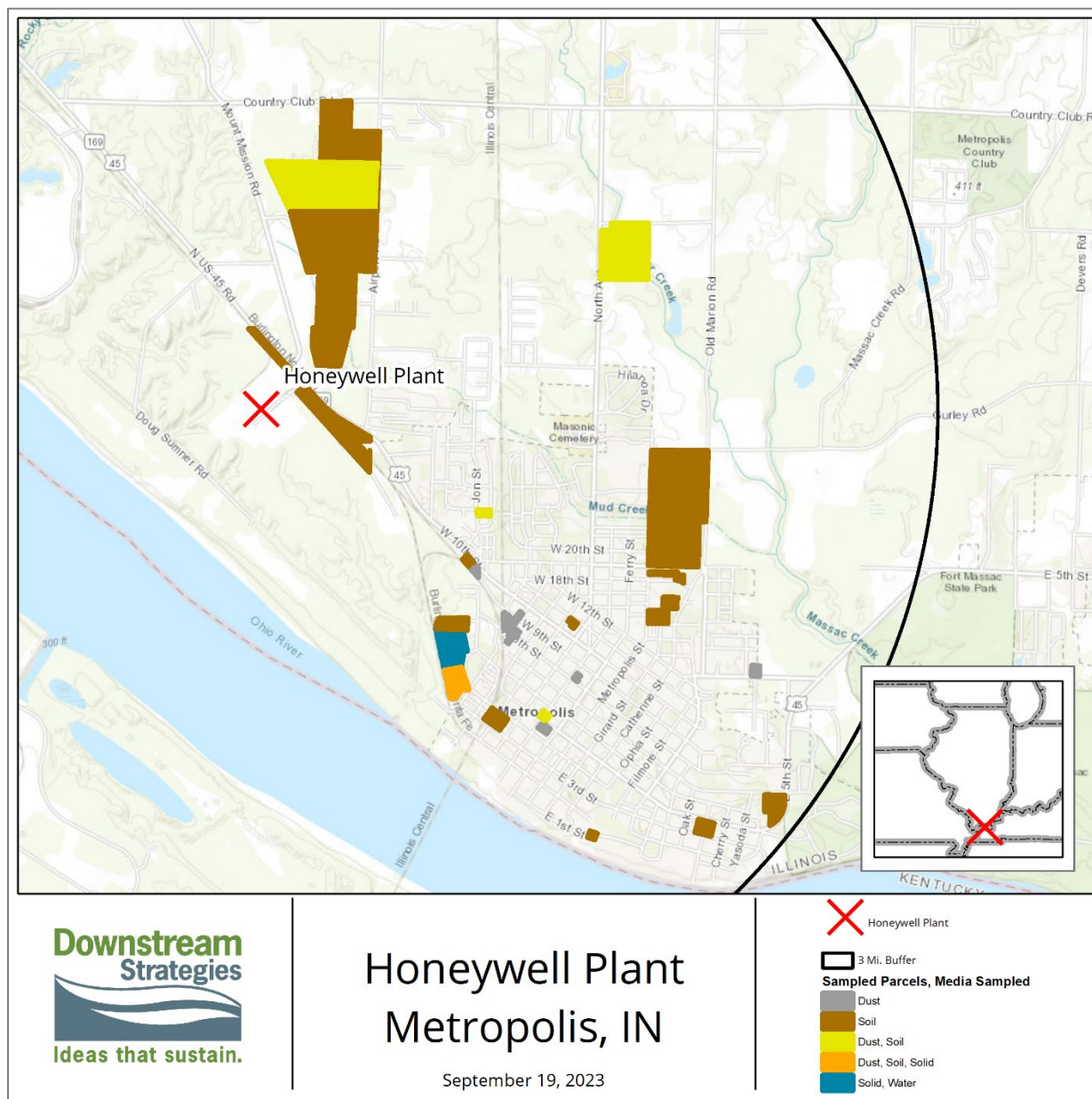
The purpose of the plaintiff sampling program was to investigate the presence of radioactive particulates from the Honeywell MTW facility at residential, commercial, and public properties in Metropolis and Massac County.

3.1 Sampling and analysis methods

Properties where soil, dust, bulk dust/material samples were collected during the plaintiff's sampling program are shown on Figure 2.

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Figure 2: Sample Location Map



3.2 Sampling methodology

Soil samples were collected as grab samples in new, laboratory-provided glass or plastic jars and preserved as required by the laboratory analytical methodology. Tape lift samples were collected as grab samples directly onto new BioTape (Zefon part #BT0050) sampling cassettes. Bulk material samples were collected in the same manner as soil samples and placed directly into laboratory-provided containers or sealed in double-layer clean plastic bags. As soon as practical after collection, samples were stored in coolers prior to delivery via express shipment to the analytical laboratory. Samples were maintained under chain of custody record from the point of collection and maintained under custody record through delivery to the third-party analytical providers.

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All samples were collected according to standard industry practice and standard operating procedures and were properly managed under chain of custody record for analysis by independent, third-party laboratory analytical service providers.

Once the desired sampling location was selected, a new pair of powder-free, nitrile gloves were donned prior to collecting each sample. After collection, sample identification numbers for each sample were recorded on sample labels affixed to the appropriate container, chain of custody forms, and the other applicable documentation to ensure blind identification to the analytical laboratory. Photographs of representative plaintiff sampling locations are shown in Exhibit 4.

Exhibit 4: Examples of plaintiff sampling locations



Massac County Courthouse located in downtown Metropolis, IL. Location for impacted plaintiff soil sample MET2023-075S.



Settled dust tape lift sample location inside Massac County Courthouse. Location for impacted plaintiff sample MET2023-072TL.



North facing view of City of Metropolis Lincoln Park athletic fields. Location for impacted plaintiff soil sample MET2023-062S.



City of Metropolis Girl Scout House/Carrell Park property and public building facilities. Location for impacted plaintiff soil sample MET2023-061S.

After collection, labeled sample containers were placed into a shipping cooler, under chain of custody, for storage until transfer via express shipment courier to Eberline Services, of Oak Ridge, TN and/or Microvision Labs, Inc. of Chelmsford MA; and as warranted to complete the requested analyses. All analytical test methods used for this project are listed in the EPA publication, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*, also known as SW-846 or other

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approved methods. Samples of dust and other particulate matter were also submitted to Microvision Laboratories (ISO/IEC 17025:2017 accreditation #98218) of Chelmsford, Mass. Analyses for analysis via scanning electron microscopy coupled with energy dispersive X-ray (SEM/EDS) in accordance with MicroVision SEM/EDS Standard Operating Procedure #MVL01.

Analytical results were delivered to Plaintiff counsel and provided to Plaintiff experts for further analysis.

3.3 Sampling Results

Analytical data was reviewed upon receipt from the laboratory. Overall data quality was acceptable and usable for its intended purposes.

Plaintiff expert Dr. Kaltofen conducted a review of data generated from the plaintiff's preliminary sampling program and concluded that radioactive particulate matter from the Honeywell MTW was identified both on and off-site in residential homes and yards, public buildings and grounds, parks and recreational facilities and commercial businesses (Kaltofen, 2023).

In his analysis, Dr. Kaltofen conducted a review of expected background concentrations from literature sources, Honeywell Metropolis reference data, and samples conducted as part of the plaintiff sampling program pertaining to the Honeywell MTW plant.

3.3.1 Contaminants of Concern

Based on this review, Dr. Kaltofen identified that samples impacted by emissions from the Honeywell MTW are those exceeding the screening criteria listed below:

- Uranium and its isotopes ≥ 2 pCi/g
- Radium-226/Radium-228 ≥ 2 pCi/g
- Thorium-230 ≥ 2 pCi/g
- Lead-210 ≥ 10 pCi/g
- Polonium-210 ≥ 10 pCi/g
- Transuranics present in any detectable concentration $>$ the combined uncertainty (UNC) and minimum detectable activity (MDA).

Trans-uranium elements or "transuranics" (TRU) are those isotopes having a higher atomic number than Uranium (i.e.. Plutonium) are almost entirely man-made (i.e.. During nuclear fuel production, nuclear weapons research and production, reprocessing of spent nuclear fuel) or are present in nature only at exceedingly small amounts.

A summary of plaintiff sampling program results for soil and dust samples analyzed for these COCs is provided in Appendix C. Results for dust samples by scanning electron microscopy (SEM) are discussed in Dr. Kaltofen's report. Soil or bulk dust analytical results that exceeded one of the impacted criteria above are highlighted in the summary table.

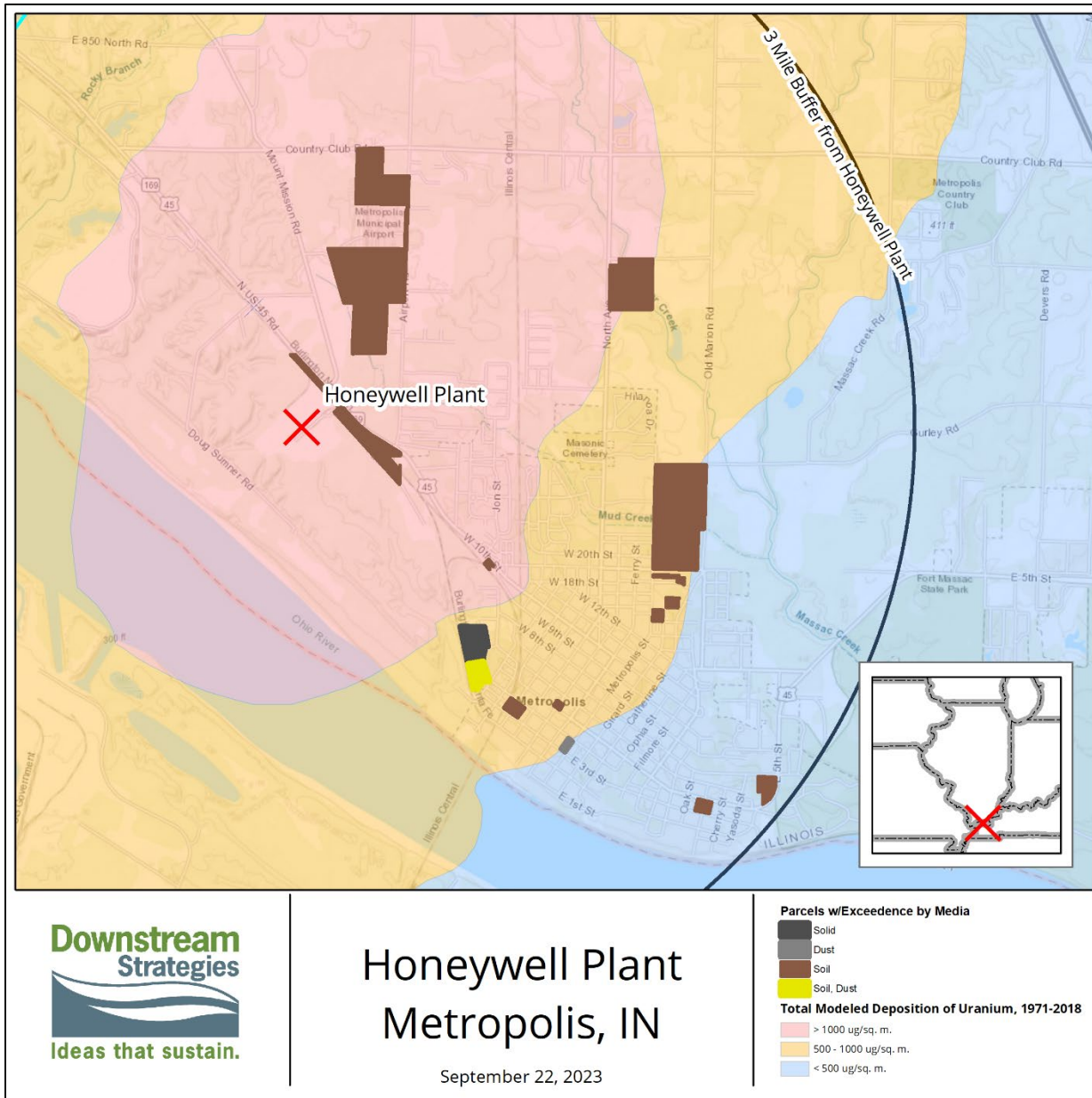
3.3.2 Airborne transport pathway

Both plaintiff experts Dr. Kaltofen and Dr. Auberle (Auberle, 2023) identified the airborne transport mechanism for transport of radioactive particulates from the Honeywell MTW to receptors in the City of Metropolis and Massac County. Given the likelihood of airborne particle transport (including resuspension) of radioactive material, the proposed class boundary is a simple circle drawn to encompass 95 % of impacted samples in Illinois (Kaltofen, 2023).

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The proposed class area then represents a 3-mile radius from the Honeywell MTW facility based on the radius containing 95% of the impacted samples (Kaltofen, 2023). Figure 3 depicts the location of samples “impacted” according to the plaintiff screening criteria and modeled Honeywell MTW radioactive particulate deposition isopleths in Metropolis and Massac County.

Figure 3: Honeywell MTW particulate deposition and impacted samples



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4. NECESSITY FOR SITE CHARACTERIZATION

Based on my review of the plaintiff sampling program analytical findings and comparison to the impacted criteria developed by Dr. Kaltoven; and the analyses provided by plaintiff experts Dr. Auberle, and Dr. Plato (Plato, 2023), it is my opinion that radioactive particulate emissions from the Honeywell MTW facility have been released and reached human receptors in the City of Metropolis and Massac County at levels that present a likelihood to exceed acceptable health risk-based criteria.

The plaintiff preliminary screening sampling program results do not provide sufficient data to evaluate risk on a property-by-property basis, or to evaluate current and future unrestricted use under residential exposure scenarios.

The collection of supplemental information is necessary and warranted to further evaluate potentially unacceptable health risk from Honeywell MTW radioactive particulates in the proposed class area.

4.1 Site Characterization Program

The plaintiff sampling program to date has been consistent with screening level assessments conducted to determine whether further investigation is warranted. This approach is consistent with the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund.

4.1.1 ARAR's and Other Requirements

Under CERCLA response actions preliminary remediation goals (PRGs) or proposed cleanup standards are developed during the remedial investigation and feasibility study phase and are based on applicable local, state, and federal requirements - Applicable or Relevant and Appropriate Requirements (ARARs) - and other readily available information, such as concentrations associated with 1E-6 (one in a million) cancer risk or a hazard quotient equal to one for non-carcinogens calculated from USEPA toxicity information.

The Plaintiff's sampling program and expert analyses performed to date are consistent with EPA-led actions under CERCLA. CERCLA cleanups follow a stepwise process as generally outlined below (USEPA, 2011):

1. Preliminary Assessment
2. Remedial Investigation/Feasibility Study (Site characterization)
3. Remedy Decision
4. Remedial Design/Remedial Action
5. Construction Completion
6. Post Construction Completion
7. Site Reuse/Redevelopment

Additional steps for listing and delisting on the National Priorities List (NPL) are not shown since this matter falls under CERCLA's citizen suit provision, 42 U.S.C. § 9659 and not led by USEPA.

Initial PRGs may also be modified based on exposure, uncertainty, and technical feasibility factors. As data are gathered during remedial investigation and feasibility studies, PRGs are refined into final contaminant-specific cleanup levels. Based on consideration of factors during the analysis and using the PRG as a point of departure, the final cleanup level may reflect a different risk level within the acceptable risk range (1E-4 to 1E-6 for carcinogens) than the originally identified PRG (USEPA, 1999).

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ALARA is an acronym for "as low as (is) reasonably achievable," (10 CFR 20.1003). Regarding radiation protection, this means making every reasonable effort to maintain exposures to ionizing radiation as far below the dose limits as practical. Regarding public exposures, the ALARA principle is required under the National Contingency Plan (NCP)/CERCLA.

The Plaintiff's sampling program and work by other plaintiff experts is part of the preliminary assessment and Remedial Investigation/Feasibility Study process.

The objectives of the Site Characterization program will be to collect additional information and fill data gaps to support:

- site characterization
- definition of the limits of contamination
- risk assessment and modeling
- development a site-specific reference background
- feasibility studies and remedial action alternatives
- environmental permits and health and safety plans

4.1.2 Site Characterization Methods

The sampling approaches that I propose are generally consistent with radiological sampling programs conducted under other EPA-led actions (EPA, 2017). For estimation purposes and to ensure sufficient data to evaluate risks at individual properties for residential unrestricted current and future use, I propose sampling as below.

The site characterization sampling should include the collection of soil samples from outside the residence, wipe samples from inside the residence, and bulk dust samples from inside the residence.

Soil, wipe, and bulk samples should be analyzed for uranium and thorium isotopes via EPA Methods 908.0 and 907.0, respectively; Radium isotopes via EPA Methods 903.3 Modified and 904.0; Lead 210 by EML PB-01 Modified; Isotopic Plutonium via EML Pu-02- Modified; Technetium-99 via EIChroM Tc-01 Modified.

Soil sampling

- from 0-2-inch interval
- 5- point aliquots, FY/BY
- Discrete, discretionary downspouts, low-lying areas as areas of potentially greatest impact from off-site sources of contamination
- Quality assurance/quality control duplicates and matrix spike/matrix spike duplicates (MS/MSD) at a rate of 1 per 10.
- Additional samples as warranted based on property size (i.e. 5,000 sf, 10,000 sf, larger)

Interior Dust

- Wipe samples -12 per building plus 2 field blank/building
 - Surfaces including floors, walls, and other accessible surfaces; floor surfaces near entrances; and floor and wall surfaces near clothes dryers.
 - Template (200 cm² or approx. 14-inch x 14-inch) over the sampling surface while a wipe pressed against the sampling surface with moderate pressure and swept over the sampling surface in multiple "S" pattern passes. A new sampling template for each wipe sample. Sample placed into food-grade releasable plastic bags.

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- High occupancy
 - Low occupancy
 - Entrances
 - Any samples indicating impacted criteria confirmed with SEM/EDS (presume 2 per structure by wipe or tape lift- below)
- Bulk Dust
 - Attempt to collect 3 grams of dust
 - Either by grab or use of a pre-weighed micro-vacuum cassette in accordance with ASTM International (ASTM) D7144 “Standard Practice for Collection of Surface Dust by Micro-vacuum Sampling for Subsequent Metals Determination.”
- Tape Lifts – analysis by SEM/EDS

Data from the site characterization sampling should be reviewed, validated, and qualified, as appropriate for use in developing updated PRGs; screening of analytical findings on a property-by-property basis; and for use in modeling, risk assessment, and feasibility studies.

A site-specific Sampling and Analysis Plan or Field Sampling Plan, Quality-Assurance Project Plan, Health and Safety Plans will need to be developed to guide those implementing the site characterization sampling program.

4.1.3 Estimate of probable cost

I have prepared cost estimates for additional site characterization by sampling of the interior of structures and yards; public buildings and grounds; and commercial/office structures in the proposed class area (3-miles radially from the Honeywell MTW facility). My estimate provides line items costs and estimating assumptions for each proposed task and is included as Appendix D.

My cost estimate is sensitive to the size of the investigation area and number of individual properties to be evaluated. My estimates for properties to be included in the site characterization program are based, in part, on a listing of properties provided by the City of Metropolis as owned by the city. It is noted that due to condemnation, donation, seizure, or other types of real estate property transactions, the roster of City-owned properties may change at any time. In the City-owned properties, I included properties that are owned by and under City control and management, that cannot be transferred due to deed restrictions (i.e. “FEMA properties”) but have included for preliminary planning and cost estimation.

5. NEED FOR AREA-WIDE REMEDY

Plaintiff sampling data collected in the Metropolis area, air modeling and dose calculation analysis provided in the expert reports of Dr. Kaltofen, Dr. Auberle, Dr. Plato, and Dr. Troast (Troast, 2023) demonstrate radioactive microparticles from the Honeywell MTW distributed throughout the City of Metropolis and into an area extending at least three miles from the facility, including inside homes and public structures.

Dr. Kaltofen notes, resuspension of deposited Honeywell contaminated radioactive micro particulates is also a health concern not fully assessed by current modeling efforts and that targeted soil sampling to identify high concentration source areas and further modeling of resuspension and subsequent dispersion is needed to fully evaluate long-term risk.

As air dispersed contaminants, Honeywell MTW-related contaminants of concern (COCs) may enter the interior of residences or other structures via tracking from contaminated exterior surfaces, intake

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through HVAC systems, open windows and doors, airflow induced by changes in barometric pressure, or other pathways.

6. CLEANUP METHOD

I was asked by Kevin Thompson to present my opinion of a recommended cleanup methodology to remediate Honeywell MTW COCs impacts to exterior soils and the interior of structures which may be applied commonly to a class area. I base my opinion of an appropriate cleanup methodology on contemporary review of several U.S. EPA Records of Decision where air-dispersed contaminants have been deposited. The remedial strategies selected to reduce community risks from exposure to these contaminants involved intensive cleaning of structural interiors and removal and replacement of contaminated soils.

My opinion is also based on my direct experiences serving as the remediation technical advisor for the Perrine v. DuPont Remediation Settlement in Harrison County, West Virginia where such a remedial strategy was successfully implemented.

It is my opinion that a scalable cleanup methodology is available to reduce exposure at City and County-owned properties to persistent Honeywell MTW-related COCs that have been demonstrated throughout the proposed three-mile class area. It is also my opinion that costs for implementing a remedy can be developed in scalable units that can be applied to all affected properties.

It is noted that source control is critical to the effectiveness of any remedial strategy for the City and County-owned properties. Unless ongoing sources of contamination from the Honeywell MTW into the surrounding area are stopped or contained, the need for future remediation is likely to remain.

6.1 Cleanup Method

From the expert report of Dr. Kaltofen and Dr. Troast, Metropolis MTW- specific COCs have been identified as uranium, uranium daughter products, transuranic elements, and fission products. According to modeling and Plaintiff sampling results discussed herein, these COC's have been distributed over a large spatial area as fractions of airborne particulate matter discharged from the Honeywell MTW.

Based on this premise, my opinions of a cleanup methodology to reduce concentrations of these compounds at City and County-owned properties and structures are presented in the following sections. I provide these opinions under the assumption that these methods would be applied to areas where the objective is to reduce risk from exposure to the Honeywell MTW COCs.

The objectives for class area property remediation of interior dust and exterior soil are to achieve unlimited use and unrestricted exposure, and long-term effectiveness.

The remedial methods described in the following subsections present my recommended approach for contaminant removal to achieve these objectives for City and County-owned properties that are demonstrated by the assessment sampling program to be in non-attainment.

Analysis of site characterization sampling results may indicate the need for either or both interior dust and exterior soil remediation.

6.1.1 Contaminated soil removal and replacement

As air dispersed contaminants, soil impacts to City and County-owned properties by air dispersed Honeywell MTW COCs are expected to be limited to the upper soil horizon. Remediation of elevated

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exposure to soil contaminants deposited by this mechanism will normally only require remediation of the upper six inches of soil, or, at maximum, two feet of soil (USEPA 2017, 2019).

When soil remediation is indicated by future analysis of assessment sampling results, my current recommendation is that one foot of soil is excavated to effectively remove Honeywell MTW COCs from City and County properties.

Soil removal and replacement is recommended since other methods, such as capping, are difficult to implement and maintain. I do not recommend the use of institutional controls to limit exposure to COCs since it would impose limits on landowner use of their property and may not be accepted; or may be difficult to ensure future protectiveness.

In addition to providing a source of direct exposure for occupants of City and County-owned properties, exterior soil is a substantial contributor to contaminants in interior dust. The USEPA Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK) uses a default value of 70 % for the contribution of lead in outdoor soil to house dust levels (EPA, 1998). Where soil remediation is required to achieve remedial objectives, it is recommended that soil remediation is completed before interior cleaning to limit the potential for re-contamination of previously cleaned interiors.

Relocation of occupants during remediation is recommended. In my experience, I expect a minimum of seven days of relocation required during active remediation for occupants. Four on-site working days for excavation and soil replacement, with day five for sod replacement, restoration and final site cleanup, and performance of in-place confirmatory sampling. Days six and seven are needed for expedited laboratory turnaround time or post-remediation verification surveys, and, if results demonstrate attainment, notification to occupants that the property is ready for re-occupancy, or that interior remediation may begin.

Excavation would be performed for accessible soil surfaces utilizing equipment appropriately sized for individual properties. Accessible areas include grass covered and bare soil areas and unpaved parking areas or driveways. Areas inaccessible to remediation will be within 2-feet of building foundations; covered by paving; within 6-12 inches of the footprints of ancillary structures including outbuildings, and sheds; areas covered by landscaping, and within the canopy of woody vegetation. Soil remediation will be performed as near as possible to apparent property boundaries, and within six inches of fences. Hand digging should be performed to remove the sod layer from inaccessible areas, with replacement sod applied during restoration.

After contaminated soil removal, approximately one foot of soil that has successfully passed testing as clean fill in accordance with IEPA clean fill policy (IEPA, 2012) should be used to replace excavated material to near pre-existing grade, followed by sod replacement or other restoration appropriate to the original surface. Sod should be sampled and analyzed in place along with the replacement fill material during the soil post-remediation confirmatory sampling. Clean replacement fill, together with sod replacement, would provide a minimum one-foot clean protective soil cover.

Dust suppression is recommended during land disturbing activities and work area perimeter monitoring is necessary to ensure work practices prevent distribution of airborne particulates.

Excavated contaminated soil should be transported to a centralized staging area developed to support remediation of multiple properties. Here support facilities and supplies would be staged in a secure perimeter. The centralized facility could be moved periodically to optimize travel distances between active residential work areas and the receiving landfill facility and would be constructed with all appropriate environmental monitoring and erosion and sediment control best management practices. The staging area would receive loads of excavated contaminated soil, utilizing smaller

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trucks appropriate for residential areas. Clean tested backfill material collected from off-site donor sites would also be staged here pending delivery to the residential remediation work areas. The centralized facility would minimize truck trips and loading times from residential areas by utilizing larger trucks and equipment that can load trucks quickly, minimizing travel time and cost. An equipment/truck wash would be established to prevent tracking of contaminants during transport.

Waste characterization sampling required for landfill permit compliance would be performed at the central facility to confirm waste classification.

Post remediation confirmatory sampling should be completed immediately following soil and sod replacement. Once soil has been replaced and demonstrated in attainment by confirmatory sampling, interior cleaning should be performed.

6.1.2 Interior dust cleanup

Attic dust may serve as a reservoir for contaminants that can be mobilized to other portions of the interior occupied spaces. In theory, contaminated dust does not present a current health-risk to occupants so long as it remains contained within an area that does not provide exposure to occupants. However, if the contaminant mass is present within a structure or area accessed by workers, future exposure cannot be ruled out. Future occupant behavior includes renovations; repairs resulting from storm, fire, or plumbing leak damage; or even demolition of the structure are all reasonably foreseeable future conditions that would provide workers, or other occupants with exposure to contaminants and provide a pathway for contaminants to be moved into occupied functional spaces. This is true for contaminants that may have formerly been sequestered within wall-cavities, crawlspaces, or other inaccessible portions of the structure. However, for basements and attics that are even periodically accessed by occupants or building maintenance workers, a potentially complete exposure pathway may already exist. Further, periodic access by occupants and workers into these areas provides a pathway by which contaminants may be transferred into actively occupied areas.

From my personal observation during the plaintiff sampling program, it would be exceedingly difficult to confidently conclude that contaminants in attic dust have not and would not in the future continue to contribute to the contaminant dust load inside normal functional spaces inside buildings. Many businesses and public buildings that I visited had penetrations through ceilings for electrical wiring or fixtures, cracked ceiling plaster, or unsealed access into attic areas from the interior functional spaces.

It is appropriate that sampling is performed to evaluate contaminant concentrations in both attics and basements and that inspection of the structural condition and occupant surveys are completed to evaluate potentially complete and future exposure pathways.

When assessment sampling and analysis indicates elevated risk from exposure to interior dust, remediation must be performed. This is true even when contaminants concentrations result from multiple sources, such as the combination of naturally occurring radionuclides or background levels, historical industrial emissions, and contaminated soil.

The interior remediation methodology should be performed following well established work practices in Chapter 14 of the HUD Guidelines (HUD, 2012) for all interior surfaces, consisting of an initial HEPA vacuuming, wet cleaning, and a second HEPA vacuuming after cleaned surfaces have dried. These guidelines are effective for removing lead contaminated dust and other heavy metal contaminants. For conditions not specifically addressed by the HUD Guidelines, there are well established guidelines and recommended work practices for performing remediation of fine particulate contaminants such as asbestos (29 CFR Part 1926) and lead-based paint (40 CFR 745,

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Subpart E) that should be followed. Additional planning, cleanup work practices, health and safety monitoring, waste management and handling, and disposal considerations for radiological contaminants should be followed (29 CFR 1926.53).

High-efficiency-particulate-filter (HEPA) vacuums and intensive physical cleaning methods shall be used to effectively recover fine particulate contaminants to reduce sources of ongoing exposure to COCs from interior environments. For structures impacted by the Honeywell MTW COCs as fine particulate matter, these methods and practices can be applied to reduce occupant exposure. A thorough interior cleaning process utilizing trained technicians with appropriate personal protective equipment (PPE) should be used to remove COCs from within structures, including attic areas and all functional living spaces. Thorough interior cleaning would typically include the following tasks:

1. Attic insulation removal and replacement, cleaning attic with HEPA vacuum, and sealing/encapsulation of cleaned surfaces.
2. Intensive cleaning (HEPA vacuum, wet detergent wash, HEPA vacuum)
 - Ceilings, walls, floors, baseboards, stairs, and railings
 - Light Fixtures and ceiling fans
 - HVAC vents
 - Doors and windows
 - Electrical outlets
 - Desks, counters, cupboards, cabinets
 - Equipment, sinks, stoves, appliances
3. Carpet replacement or cleaning
4. HVAC duct cleaning or replacement of flexible duct
5. Porous furniture cleaning or replacement

Work area particulate control should be maintained by inducing a negative pressure, either through containment or sufficient airflow with exhaust directed through HEPA-filtration prior to discharge. Active work areas should be isolated from previously remediated areas to limit potential for cross-contamination.

When attic spaces are identified through sampling and analysis as contributing to occupant exposure due to Honeywell MTW COCs through either a direct occupant exposure pathway or as a source of contamination to interior occupied space dust, then the attic should be remediated. The remediation of attics should include isolation and containment of the attic work area followed by insulation removal, HEPA vacuuming of all exposed attic interior surfaces, application of a sealer to immobilize and encapsulate any heavy metal dusts not recovered by HEPA vacuuming, followed by insulation replacement. Attic cleaning may or may not be required for all structures. The interior cleanup should begin with the attic, then proceed to lower floors in succession. The attic work area should be isolated from other areas of the structural interior. The attic insulation should be removed in sealed bags or recovered by vacuum methods and transferred to the exterior for off-site disposal.

Removal of insulation will both eliminate any accumulated heavy metals dusts contained within and provide access to the semi-porous surfaces beneath for HEPA vacuuming according to the methods further described below and in accordance with the HUD Guidelines. For attics, wet wiping techniques may not be effective for un-finished and rough textured wood surfaces. Therefore, a sealer should be applied to the lower truss members and floor of the attic after double-pass HEPA vacuuming to prevent re-mobilization of any particulates not recovered by HEPA-vacuuming.

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Following sealer application, new insulation should be installed to meet current building codes, or to pre-existing R-value, whichever is greater.

Following attic cleaning and re-insulation, interior cleanup should proceed to the lower floors while isolating the attic until final clearance sampling passing results are achieved.

It is anticipated that intensive cleaning with HEPA vacuums will be sufficient to recover Honeywell MTW COCs containing dusts from furniture, drapes, carpets, and other porous media within City and County owned buildings.

In cases where replacement is more cost effective than cleaning, replacement could be performed. For carpets, if passing results from confirmatory wipe sampling cannot be achieved after multiple cleaning attempts, then replacement may be necessary, so long as it is agreeable to the building occupant/owner. Recleaning and re-testing of carpets should be compared against additional relocation time and cost for new carpet installation.

Relocation of occupants will be required during a remedial effort to include the cleaning procedure as above, final clearance sampling, and reporting to occupants. Dust wipe post-remediation clearance samples and instrument surveys should be collected from cleaned interior surfaces, including any remediated attic and basement area, with quality assurance/quality control samples collected at a frequency of one field blank per sampled property, analyzed for the Honeywell MTW COCs.

It is noted that if post-cleanup visual inspection, instrument surveys, or wipe sample results do not pass clearance criteria, recleaning of the failed area and resampling must be performed for that area until a passing result is achieved. Recleaning of any failed areas will require careful work practices to prevent re-contamination of previously cleared areas.

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APPENDIX A: QUALIFICATIONS, PAPERS, CASES, AND COMPENSATION

Marc Glass prepared this document, with assistance from Kendra Hatcher and other Downstream Strategies, LLC staff who worked under Mr. Glass's direct supervision. The opinions presented in this report are based on commonly accepted scientific principles, as well as Mr. Glass's training and professional experience. Downstream Strategies is being compensated at hourly rates of \$210 for Mr. Glass and \$170 for Mrs. Hatcher and customary rates for other supporting Downstream Strategies staff.

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Cases in which Mr. Glass has provided expert testified as an expert at a trial or deposition include:

2023	Circuit Court of Hancock County, West Virginia	Theodore Troia v. Frontier Industrial Corp	CC-15-2019-C-66
2022	Circuit Court of Fayette County	North Hills Group v. Danny Webb & Danny Webb Construction Company, Inc.	19-C-2
2022	United States District Court for the Southern District of Texas Houston Division	Corey Prantil, et al., v. Arkema France S.A., et al	4:17-cv-2960
2021 2020	Circuit Court of Monongalia County, West Virginia	Northeast Natural Energy LLV v. Edward A. Sine and Melody J. Sine	18-C-99
2020	Circuit Court of Common Pleas of Washington County, Pennsylvania	Louise Kowall, Donna Kopecek, and Evelyn Vehouc, individually and on behalf of all others similarly situated, vs. United States Steel Corporation, Inc. a Delaware corporation doing business in Pennsylvania and USX Corporation, a Delaware corporation	2017-3355
2020	United States District Court, Eastern District of Kentucky, Central Division at Lexington	Kentucky Waterways Alliance and Sierra Club v. Kentucky Utilities Company	5:17-00292-DCR
2019	Circuit Court of Jefferson County, West Virginia	Orlando and Robin Robinson v. Griffith Energy Services, Inc., et al.	17-C-195
2018	United States District Court For the Southern District of Texas Houston Division	Shannan Wheeler et al., v. Arkema Inc.	4:17-cv-2960
2018	United States District Court for the Northern District of Ohio, Eastern Division	Freshwater Accountability Project v. Patriot Water Treatment, LLC, and City of Warren, Ohio	4:17-cv-1361
2016	United States District Court for the Southern District of West Virginia	Ohio Valley Environmental Coalition, West Virginia Highlands Conservancy, and Sierra Club v. Pocahontas Land Corporation	2:15-cv-15515
2015	Circuit Court of Ohio County, West Virginia	Andrews, et. al. v Antero, et. al.	13-C-3000
2014	Circuit Court of Jefferson County, West Virginia	Eleanor Rodman, John Rodman IV, and William Rodman v. Southern Lithoplate, Inc., Spectratech International, Inc., Imation Corp. Imation Enterprises Corp., 3M Company, and Sam T. Adams	11-C-499
2014	Circuit Court of Kanawha County, West Virginia	Louis Perna v. Reserve Oil & Gas, Inc.	11-C-2284
2014	Circuit Court of Harrison County, West Virginia	Holmes, Pasternak v. City of Bridgeport	13-C-436-2
2011-2017	Circuit Court of Harrison County, West Virginia	Perrine v. Dupont Settlement Remediation Technical Expert	04-C-296-2
2011	United States District Court for the Northern District of West Virginia	Larry and Jana Rine v. Chesapeake Appalachia, LLC	5-11-cv-4

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**Reports prepared in support of litigation; declarations or testimony for hearings;
expert services supporting litigation:**

2023	Circuit Court of Hancock County, West Virginia	Theodore Troia v. Frontier Industrial Corp	CC-15-2019-C-66
2023	Court of Common Pleas of Washington County, Pennsylvania, Civil Division	Louise Kowall, Donna Kopecek, Evelyn Vehouc, individually and on behalf of all similarly situated V. United States Steel Corporation, Inc., a Delaware corporation doing business in Pennsylvania and USX Corporation, a Delaware corporation	2017-3355
2021	United States District Court For the Southern District of Texas Houston Division	Wheeler, et al. v. Arkema, Inc,	4:17-cv-2960
2020	Circuit Court of Monongalia County, West Virginia	Edward A. Sine and Melody J. Sine v. Northeast Natural Energy LLC	18-C-99
2020	Circuit Court of Barbour County, West Virginia	David B. Ward, et al. v. Aspen Builders, Inc., et al.	18-C-28
2019	United States District Court, Eastern District of Kentucky, Central Division at Lexington	Earthjustice Kentucky Waterways Alliance and Sierra Club v. Kentucky Utilities Co.	5:17-cv-00292- DCR
2019	Court of Common Pleas of Washington County, Pennsylvania, Civil Division	Louise Kowall, Donna Kopecek, Evelyn Vehouc, individually and on behalf of all similarly situated V. United States Steel Corporation, Inc., a Delaware corporation doing business in Pennsylvania and USX Corporation, a Delaware corporation	2017-3355
2019	Circuit Court of Monongalia County, West Virginia	Edward A. Sine and Melody J. Sine v. Northeast Natural Energy LLC	18-C-99
2017	United States District Court for the Southern District of West Virginia	Ohio Valley Environmental Coalition, et al., v. FOIA Coal Company, LLC	2:15-cv-1371
2016	American Arbitration Association	James and Michelle Hopkins v. Dan Ryan Builders, Inc.	01-15-004-7301
2014	United States District Court for the Middle District of Pennsylvania	Berish, et al., vs. Southwestern Energy Production Company, et al	3:10-cv-1981

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APPENDIX B: MARC GLASS CV

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MARC EDWARD GLASS

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Professional Profile

Downstream Strategies, LLC
Principal/Member, 2012-present

Morgantown, W.Va.

Cira and Associates Consulting, LLC
Managing Partner, 2004-12

Morgantown, W.Va.

August Environmental, Inc.
Senior Project Manager/Senior Scientist, 2002-04; Project Manager, 2001-02;
Environmental Scientist, 1999-2001

Morgantown, W.Va.

Education

West Virginia University, Morgantown
Graduate studies and research in Soil Sciences, 1996-1999.
B.S. Environmental Sciences awarded 1993.

Morgantown, W.Va.

Projects

Mr. Glass has over 24 years of experience in environmental consulting and management, including over twenty years as a West Virginia Department of Environmental Protection Licensed Remediation Specialist (LRS). He is skilled in the evaluation and remediation of environmental contamination. Mr. Glass' experience includes Phase I and Phase II environmental site assessments, petroleum and chlorinated solvent site investigations, design and installation of monitoring well networks, aquifer testing, asbestos and biological remediation and project supervision, preparation of facility Spill Prevention Plans for above ground and underground storage tank facilities, and mold investigation and remediation. Mr. Glass's experience includes management of remediation projects in the context of the West Virginia Voluntary Remediation Program (VRP) and Pennsylvania Department of Environmental Protection Land Recycling Program.

Scientific analyses

Ambient air monitoring

Designed and implemented a multiple phase ambient air monitoring program to investigate potential impacts from a multiple well, non-conventional shale gas development site. Investigation coordinated to capture temporal effects and discrete stages of well development. Developed quality assurance/quality control protocols and coordinated field sampling events and technical staff. Performed review of laboratory analytical data and comparison to multiple acute and chronic exposure criteria (Downstream Strategies, 2012, confidential client).

Performed analysis and evaluation for volatile organic compound vapor intrusion pathways at multiple hazardous waste release sites in Pennsylvania and New Jersey (Cira and Associates Consulting LLC 2004-12, various private clients).

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Soil contamination and remediation

- Lead investigator responsible for design and implementation of a large-scale, multi-media field sampling program to evaluate environmental releases from an industrial fire at an organic peroxide chemical production facility in southeast Texas. The investigation area extended for over nine square miles and required multiple phases. (Downstream Strategies, 2017, confidential client).
- Designed and implemented a field sampling program for the evaluation and characterization of heavy metals impacts to residential structures and surface soils at properties impacted by airborne emissions from historical zinc smelter operations in southwestern Pennsylvania. (Downstream Strategies, 2017, confidential client)
- Prepared written technical analysis of soil sampling data pertaining to environmental contamination from various oil and gas production sites in West Virginia (Downstream Strategies, 2012-2014, confidential clients).
- Performed soil boring and field sampling programs to investigate environmental releases from un-conventional shale gas development activities (Cira and Associates Consulting and Downstream Strategies, 2011-present, for confidential clients).
- Assessed surface and sub-surface soils for impacts from natural gas wells and coal mines (Downstream Strategies, 2012-present, for various clients).
- Court-appointed Remediation Technical Expert for oversight of Class Action Property Remediation Program. Presented at numerous town-hall meetings and court hearings to communicate complex technical concepts and remedial approaches to a diverse public audience. Developed sampling strategy to delineate contemporary distribution of heavy metals impacts from a former zinc smelter operation for over 200 residential and commercial properties. Used GIS tools to perform spatial evaluation of large quantities of data. Performed statistical analysis of discrete data sets to evaluate inclusion of additional properties to remediation program. Drafted scope of work documents and provided technical consultation to Settlement Administrator during public outreach program, field sampling program and remediation contractor selection. (Cira and Associates Consulting and Downstream Strategies, 2011-present, for confidential client).
- Source soil excavation of petroleum contamination at multiple underground storage tank sites in West Virginia, Maryland, Ohio and Pennsylvania (Cira and Associates Consulting, 2004-12, for various private clients).
- Served as primary technical resource for delineation of subsurface contamination, pilot study performance evaluation, and remedial technology cost-benefit analysis (Cira and Associates Consulting, 2004-12, for various private clients).
- Provided technical evaluation and budget/cost analysis to assist clients in selecting optimal mitigation strategies for contaminated properties. Fostered relationships between clients and regulatory officials to expedite project timelines. Operated within multiple federal, local, and state regulatory frameworks and collaborated with regulatory and local officials to perform geologic investigations within public right-of ways (Cira and Associates Consulting, 2004-12, for various private clients).

Groundwater contamination and remediation

- Designed and implemented a surface water and sediment monitoring program to investigate chlorinated solvent and heavy metal contamination originating from an adjacent property in eastern West Virginia (Downstream Strategies, 2014, confidential client).
- Performed field investigation and technical consultation pertaining to potential adverse impacts to multiple private drinking water wells in northwestern Pennsylvania from unconventional oil and gas development activity (Downstream Strategies, 2014, confidential client).
- Conducted review of private drinking water well sampling data collected by operator in response to a spill of oil and gas drilling fluids in north central West Virginia. Provided written summary with technical recommendations for on-going monitoring approaches (Downstream Strategies, 2013, confidential client).
- Prepared written technical analysis of surface and groundwater sampling data trends for an oil and gas production site located on private property in West Virginia (Downstream Strategies, 2012, confidential client).
- Assessed water wells and surface waters for impacts from natural gas wells and coal mines (Downstream Strategies, 2012-present, for various clients).
 - Conducted site assessments, conceptual site model development, sampling and analysis plans, ecological risk screening, participated in residual risk assessments, and drafted remedial action work plans for sites entering the West Virginia Department of Environmental Protection Voluntary Remediation and Redevelopment Program (VRRP) (August Environmental, Inc. and Cira and Associates Consulting LLC, 2003-12, various private clients).

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Prepared Site Characterization Plans, Corrective Action Plans, NPDES permit applications, Quarterly Monitoring Reports associated with corrective actions for leaking underground storage tank (LUST) facilities. Responsibilities included technical evaluation of remedial alternatives and remedy selection systems (Cira and Associates Consulting LLC, 2004-12, various private clients).

Responsible for installation and operation and maintenance of dual phase, ground-water table suppression, soil vapor extraction, air sparging and oxygen release compound remediation systems (Cira and Associates Consulting LLC, 2004-12, various private clients).

Conducted numerous investigations to delineate hydrocarbon contamination originating from leaking underground storage tanks located in Pennsylvania and West Virginia (Cira and Associates Consulting LLC, 2004-12, various private clients).

Evaluated a chlorinated solvent groundwater plume at an industrial property along the Ohio River in West Virginia. Performed comprehensive technical review of existing monitoring data and developed scope of work for evaluation during a real estate transaction. Oversaw installation of Geoprobe® boreholes, performed groundwater sampling, installed and developed monitoring wells using hollow-stem auger and prepared reports and graphic presentations utilized in litigation support. (August Environmental, Inc. and Cira and Associates Consulting LLC, 2003-05, private client).

Provided technical support to staff during hydrogeologic investigations and field operations. Conducted geostatistical analysis for long-term monitoring projects to assure data quality (August Environmental, 2001-02, various private clients).

Involved with an emergency response groundwater/gasoline recovery system implemented to prevent offsite migration of non-aqueous phase liquid plume. Experience included groundwater/gasoline piezometric mapping for tracking contamination migration, preparation of permits for all aspects of construction and hazardous materials storage, equipment selection, and installation. Interim recovery performed while complying with orders from the local lead agency not to depress the groundwater table until site delineation was complete (August Environmental, 2001-02, private client).

Surface water and drinking water supplies.

Participating author for a source water protection plan and implementing an ongoing source water protection program to protect drinking water intakes from contamination and to respond effectively if contamination should occur. Specific responsibility for evaluation of real-time monitoring technology and implementation of early warning contaminant detection system (Downstream Strategies, 2014-present, for Morgantown Utility Board).

Evaluated dye testing protocol, reviewed dilution calculations, and provided technical assistance to select trace dye chemicals with lowest toxicity for a major public water supply utility in north central West Virginia. Approach resulted in mitigation of potential impacts from leak testing at a large chemical manufacturing waste treatment pond upstream of source water intakes (Downstream Strategies, 2014).

Led the development and implementation of a watershed monitoring program to protect source water for a major utility in north central West Virginia (Downstream Strategies, 2014).

Designed and implemented a tap water testing and assessment program to evaluate impacts to private residences and commercial clients from a chemical spill impacting the surface water source for a public drinking water supply to over 300,000 customers in central West Virginia. (Downstream Strategies, 2014)

Prepared a pump test methodology to document maximum sustainable yield and water quality for a public water groundwater supply well prior to encroachment by a stone quarry operation (Downstream Strategies, 2013).

Solid waste management

Prepared a technical report entitled "Comments on Proposed Changes to New York State Solid Waste Regulations" supporting a non-profit agency's public comments regarding revisions to Title 6 of the New York Code of Rules and Regulations (NYCRR) Part, 360, Solid Waste Management Facilities Regulations affecting management of unconventional drilling waste streams and facility environmental monitoring programs. (Earthworks, August 15, 2016).

Prepared technical comments supporting a local solid waste authority public comment submittal regarding proposed changes to the West Virginia Solid Waste Management Rule affecting management of unconventional oil and gas drilling waste streams at municipal solid waste facilities (Wetzel County Solid Waste Authority, July 28, 2014).

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Indoor air quality

Led an indoor air and subsurface soil gas assessment pertaining to persistent vapor intrusion following remediation of a substantial release of residential home heating oil during commercial delivery.

Led field investigations and provided litigation support for multiple residential structures impacted by municipal sewage intrusion events (Downstream Strategies, 2013-2014).

Evaluated indoor air monitoring data for a commercial structure impacted by soil vapor intrusion from historical underground storage leakage (Downstream Strategies, 2013).

Led an investigation using specialty assessment tools and methods to quantify microbial impacts from a storm related water intrusion event at a multi-unit health care facility in Pennsylvania (Downstream Strategies, 2012).

Led collaborative remediation efforts to complete major renovation of commercial buildings adversely impacted by hazardous materials and/or biological agents (Cira and Associates Consulting LLC and Downstream Strategies, 2002-present, various private clients).

Conducted indoor air quality monitoring program and forensic analysis for microbiological impacts relating to construction practices. Prepared technical report and graphic presentations in support of litigation proceedings (Cira and Associates Consulting LLC, 2011, private client).

Participated in installation of sub-slab vapor recovery system to mitigate vapor intrusion to large commercial building functional interior spaces from subsurface chlorinated solvent groundwater contaminant plume (Cira and Associates Consulting LLC, 2010, private client).

Conducted indoor air monitoring programs to evaluate potential impacts to interior from sub-surface vapor intrusion pathways (August Environmental, Inc. and Cira and Associates Consulting LLC, 2004-12, various private clients).

Led development and implementation of Indoor Air Quality Program to expand scope of client services (August Environmental, 2002-04).

Agriculture and the environment

Quantifying the environmental benefits of a poultry litter baling facility in the eastern panhandle of West Virginia (Downstream Strategies, 2012, for Blue Moon Fund).

Voluntary Remediation and risk-based corrective actions

- Project manager and senior technical lead serving private commercial and municipal clients as a West Virginia Licensed Remediation Specialist (LRS) of record under state led risk-based Voluntary Remediation Program (Downstream Strategies, 2014-present, for National Salvage and Service Corporation, City of Thomas, West Virginia, Friends of the Cheat).

Environmental due diligence and brownfields

Conducted multiple Phase I ESAs for real-estate transactions associated with establishment of Conservation Easements at various tracts located throughout West Virginia (West Virginia Land Trust, 2016-2021).

Project lead and West Virginia Licensed Remediation Specialist providing technical assistance and overall program management to several West Virginia local governments and non-profit organizations supported by USEPA Brownfield Assessment and Cleanup Grants for Hazardous Substances. Completed and on-going tasks include multiple Phase I and Phase II Environmental Site Assessments, development of USEPA-approved Sampling and Analysis Plans and a Programmatic Quality Assurance Project Plans, analysis of brownfield cleanup alternatives, and reuse planning. (Downstream Strategies, 2015-current).

Managed Phase I Environmental Assessment process for multiple properties in Pocahontas County, West Virginia for the West Virginia In Lieu Fee Stream and Wetland Mitigation Program in accordance with ASTM Practice E 1527-13.

Led Phase I Environmental Site Assessment process for three contiguous properties totaling 260-acres contemplated for conservation easement along the New River in Greenbrier and Pocahontas Counties, WC (Downstream Strategies, 2013, National Committee for the New River).

Managed or directed numerous environmental due diligence Phase I and Phase II environmental site assessments (ESA's) at industrial sites, brownfields, and other properties to assess environmental liabilities. Transactions have ranged from single sites to large-scale corporate transactions. This work has involved developing quantitative cost estimates for the areas of environmental concerns identified. (Downstream Strategies, 2013-present, August Environmental, Inc., and Cira and Associates Consulting, LLC, 2002-12, various private clients).

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Science communication

Presenter/Guide for the West Virginia Department of Environmental Protection Advanced Leadership Training, Thomas, West Virginia, May 9, 2018.

Speaker/Panel Discussion Leader, 2017 National Brownfields Conference “Rural Revitalization: From Deteriorating Coal Town to Hip Tourist Destination”. December 5, 2017.

Presenter/Guide for the West Virginia Department of Environmental Protection Emerging Leaders Field Trip, Thomas, West Virginia, August 18, 2016.

Presentation to the Wetzel County Solid Waste Authority: “Review of Wetzel County Sanitary Landfill NPDES Permit”, New Martinsville, WV, August 4, 2016.

Invited participant, Tucker County West Virginia, Regional Planning for Small Communities Stakeholder Workshop, 2015.

Invited presentation to the W.Va. Legislature Judiciary Committee (December 2014, Proposed Changes to the West Virginia Solid Waste Management Rule).

Provided support for litigation pertaining to the fate and transport of groundwater contamination in karst geology.

Provided deposition and technical support for litigation pertaining to off-site migration of volatile organic compounds and dissolved phase chlorinated solvents from an adjacent industrial facility. Prepared a detailed estimate of probably cost for additional site characterization of contaminant plume and various cost scenarios for remediation. (Downstream Strategies, 2014-2015, private client).

Conducted technical review and prepared comments to a county solid waste management authority in northern West Virginia on proposed changes to the West Virginia Solid Waste Management Rule pertaining to management of oil and gas related drilling wastes in municipal landfills. (Wetzel County Solid Waste Authority, 2015).

Multiple presentations to watershed groups communicating experiences with monitoring for potential impacts from oil and gas operations in West Virginia and Pennsylvania (Downstream Strategies, 2013-2014).

Invited participant at United States Environmental Protection Agency (USEPA) Technical Workshop on Subsurface Modeling (Downstream Strategies, LLC, June 3, 2013, USEPA).

Invited participant at United States Environmental Protection Agency (USEPA) Wastewater Treatment and Related Modeling Technical Workshop (Downstream Strategies, LLC, April 18, 2013, USEPA).

Invited participant at United States Environmental Protection Agency (USEPA) Well Construction/Operation and Subsurface Modeling Technical Workshop (Downstream Strategies, LLC, April 16-17, 2013, USEPA).

Provided expert testimony in federal court regarding petroleum hydrocarbon contamination of soil and groundwater associated with natural gas development (Cira and Associates Consulting, 2011, for confidential client).

Provided expert testimony in circuit court pertaining to heavy metals contamination and remediation (Cira and Associates Consulting, 2011, for confidential client).

Presented complex information to a wide variety of stakeholders having diverse technical backgrounds and interests (Cira and Associates Consulting and Downstream Strategies, 2004-present, for various private clients).

Worked closely with private clients, legal professionals, technical professionals, academia, regulatory officials, financial institutions, vendors, non-profit organizations (Cira and Associates Consulting, 2004-2012, various private clients).

Presented to city council, zoning boards and public groups to attain cooperation from local government for large-scale petroleum remediation project (August Environmental, 2001-02).

Prepared multi-media presentations for meetings with senior management, regulatory officials, and legal professionals (August Environmental, 2001-02).

Compiled field data into graphical presentations as soil boring logs, well construction diagrams and detailed site figures (August Environmental, 1999-2001).

Project management

Principal of environmental consulting firm Downstream Strategies, LLC and lead of the environmental monitoring and remediation services. Responsible for daily operations, human resource management, marketing programs, standard operating procedures, profit center and overall program management. Specific duties included client development, crafting of contract documents, budget tracking, establishing project milestones and timelines, and evaluating contractor performance with direct charge of final outcomes (Downstream Strategies, LLC, 2012-present).

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Founding/Managing partner for private environmental consulting firm. Responsible for daily operations, human resource management, profit center and overall program management. Specific duties included client development, crafting of contract documents, budget tracking, establishing project milestones and timelines, and evaluating contractor performance with direct charge of final outcomes (Cira and Associates Consulting, 2004-12).

Managed more than 200 environmental cleanup projects involving petroleum distribution facilities, industrial and manufacturing facilities, commercial and residential buildings, and hazardous waste sites (August Environmental, Inc. and Cira and Associates Consulting, Downstream Strategies, LLC, 2002-present, for various private clients; federal, state, and local governments; and non-profit organizations).

Directed collaborative efforts involving geologists, scientists, engineers, and specialists having diverse technical backgrounds to attain regulatory compliance under multiple regulatory frameworks.

Provided technical supervision for hydrogeologic investigations, feasibility studies, remedial actions and numerous permitting and compliance projects.

Developed and implemented project programs, provided technical direction to obtain optimal program/project outcomes, established technical milestones, reviewed and evaluated accomplishments, performed risk assessment and mitigation plans, crafted technical documents/presentations, and performed technical cost/benefit evaluations (August Environmental, 2002-04).

Cultivated training protocols and operating procedures with primary responsibility for technical oversight (August Environmental, 2002-04).

Coordinated teams of scientists and field technicians during remedial equipment installations. Directed staff through permitting and site work phases to fully operational contaminant recovery systems. Coordinated connection to electric utility services, including new service installations, and supervised teams of electricians during installation of transformers, high-capacity electric motors, and programmable logic control circuits (August Environmental, 2002-04).

Developed pro-active task/project management style and established highly productive working relationships with new clients (August Environmental, 2001-02).

Prepared project bid documents, scope of work proposals, and budget tracking summaries; maintained schedules for compliance reporting (August Environmental, 2001-02).

Planned and assigned task orders and supervised field staff during site characterization activities for various soil and groundwater contamination sites (August Environmental, 2001-02).

Mentored new hires and summer interns (August Environmental, 2001-02).

Certifications / Memberships

Certifications

Certified Indoor Environmentalist – ACAC, 2006-present.
West Virginia Department of Environmental Protection Licensed Remediation Specialist, 2004-present.
Certified Mold Remediator – ACAC, 2004-present.
West Virginia Certified Asbestos Contractor/Supervisor, 2003-2012.

Member

West Virginia Chapter of the Air & Waste Management Association, 2013-present
Pennsylvania Council of Professional Geologists, 2012-present.
National Groundwater Association, 2010-present.
Environmental Information Association, 2009-present.

Training completed.

West Virginia Department of Environmental Protection. Voluntary Remediation Program LRS Training, September 13-14, 2022. Attained 10.5 professional development hours.

West Virginia Department of Environmental Protection. Voluntary Remediation Program LRS Training, September 14-15, 2021. Attained 2.25 professional development hours.

West Virginia Department of Environmental Protection. Voluntary Remediation Program LRS Training, February 27, 2020. Attained 5 professional development hours.

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West Virginia Brownfields Conference completed LRS Training Workshop sessions, “Voluntary Remediation Program Training for Licensed Remediation Specialists”, September 5, 2019.

West Virginia Brownfields Conference completed LRS Training Workshop sessions, “Voluntary Remediation Program Training for Licensed Remediation Specialists”, September 5, 2018.

West Virginia Brownfields Conference completed LRS Training Workshop sessions, “An Overview: The New West Virginia VRP Guidance Manual”, September 2, 2017.

Test America On-line Educational Programs “A Review of Lead Sampling, Analytical and Data”. October 24, 2017.

Professional Training Associates, Inc. “Lead Inspector Initial Training Course” and successful completion of examination for accreditation. July 14, 17, and 19, 2017.

Interstate Technology and Regulatory Council, CLU-IN seminar “Petroleum Vapor Intrusion: Fundamentals of Screening, Investigation, and Management”, October 20, 2017.

Hazardous Waste Operations Emergency Response “HAZWOPER” 8-hou Refresher Training in accordance with 29 CFR 1910.120(e), January 2017.

West Virginia Brownfields Conference completed 2 Continuing Education Credit sessions, “Treatment of Light, Non-aqueous Phase Liquids” and “Groundwater Treatment: Fate and Transport Modeling, Vapor Mitigation, and use of Liquid Activated Carbon”, September 7 & 8, 2016.

Hazardous Waste Operations Emergency Response “HAZWOPER” 8-hou Refresher Training in accordance with 29 CFR 1910.120(e), January 2016.

West Virginia Brownfields Conference completed 2 Continuing Education Credit sessions, “VRP Case Studies, Off-site Contamination and Storage Tank Regulations” and “Ensuring Environmental Sampling Integrity”, September 15 & 16, 2015.

Pennsylvania Brownfields Conference attained 9 Professional Development Hours for participation in workshops and training sessions, 2015.

Pennsylvania Council of Professional Geologists Basic Tools for Shale Exploration, 2014

United States Environmental Protection Agency and West Virginia Department of Health & Human Resources: Source Water Contaminant Detection Training; Early Warning and Response, 2014

West Virginia Department of Environmental Protection Licensed Remediation Specialist Workshop, 2013

Pennsylvania Council of Professional Geologists Marcellus Shale Environmental Management, 2012

Pennsylvania Council of Professional Geologists Soil and Groundwater Geochemistry Course, 2008.

Advanced Indoor Environmental Quality, 2008.

U.S. Micro-Solutions IDL Training Center Advanced Indoor Environmental Quality, 2005, 2007, 2009, 2011.

Waterloo DNAPLs in Fractured Geologic Media Course, 2006.

ASTM Phase I and Phase II Environmental Site Assessment Process, 2005.

West Virginia University, Advanced Contaminant Transport Hydrogeology, 2005.

Princeton Groundwater Pollution and Hydrology Course, 2004.

Princeton Groundwater Remediation Course, 2004.

Pennsylvania Department of Environmental Protection Land Recycling Program Workshop, 2004.

Occupational Safety and Health Administration 40-hour Hazardous Waste Operations (OSHA 1910.120)/8 hr. Refresher, 2004/current.

Appalachian Underground Corrosion Short Course, 2003.

Cathodic Protection Technician – NACE, 2003.

Cathodic Protection Course – Marcel Moreau Associates, 2002.

Occupational Safety and Health Administration 8-Hour Hazardous Waste Operations, current.

Public Service

- Morgantown Monongalia Metropolitan Planning Organization Citizens Advisory Committee. 2020-2021.
- Morgantown Monongalia Metropolitan Planning Organization Bicycle and Pedestrian Steering Committee, 2018-2019.
- Board of Zoning Appeals City of Westover, 2019-present.
- Board of Directors of Canaan Valley Institute, 2016-present.
- Board of Parks and Recreation of City of Westover, 2006-present. President, 2006-12.

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APPENDIX C: ANALYTICAL SUMMARY TABLES

Summary of Dust Analytical Results
 ID # 77745
 Bulk Sampling Program
 City of Metropolis-owned Properties

Sample ID	MET2022-020D	MET2022-022D	MET2023-073B
Media	Dust	Dust	Dust
Description	Metropolis DPW 634 Public Works Drive, bulk dust	Metropolis Library - 317 Metropolis Street	Bulk dust from dyson vacuum dust collector contents City Hall
Actinium-228 RES	ND	ND	ND
Actinium-228 CU	12.269	3.996	1.671
Actinium-228 MDA	23.883	6.070	3.152
Americium-241 RES			
Americium-241 CU			
Americium-241 MDA			
Bismuth-214 RES	13.594	7.733	ND
Bismuth-214 CU	8.326	3.227	0.908
Bismuth-214 MDA	12.559	4.357	1.852
Cesium-134 RES	ND	ND	ND
Cesium-134 CU	2.467	0.793	0.414
Cesium-134 MDA	6.399	2.160	0.629
Cesium-137 RES	ND	ND	ND
Cesium-137 CU	4.481	1.373	0.530
Cesium-137 MDA	7.390	2.417	0.774
Cobalt-60 RES	ND	ND	ND
Cobalt-60 CU	4.015	1.268	0.451
Cobalt-60 MDA	6.193	2.150	0.648
Lead-210 RES	35.840	1.051	2.012
Lead-210 CU	0.867	0.134	0.478
Lead-210 MDA	0.363	0.170	0.819
Lead-212 RES	ND	ND	1.829
Lead-212 CU	2.969	1.628	1.005
Lead-212 MDA	15.513	2.883	1.534
Lead-214 RES	ND	6.502	ND
Lead-214 CU	9.619	2.701	1.051
Lead-214 MDA	14.322	4.563	1.621
Neptunium-237 RES			
Neptunium-237 CU			
Neptunium-237 MDA			
Plutonium-238 RES	ND	ND	0.146
Plutonium-238 CU	0.071	0.048	0.125
Plutonium-238 MDA	0.171	0.072	0.143
Plutonium-239/240 RES	ND	ND	ND
Plutonium-239/240 CU	0.067	0.048	0.094
Plutonium-239/240 MDA	0.100	0.103	0.099
Polonium-210 RES	35.840	1.051	
Polonium-210 CU	0.867	0.134	
Polonium-210 MDA	0.363	0.170	
Potassium-40 RES	56.195	ND	10.772
Potassium-40 CU	38.398	11.949	5.451
Potassium-40 MDA	52.825	23.335	5.859
Protactinium-234m RES	ND	ND	ND
Protactinium-234m CU	368.062	132.690	42.306
Protactinium-234m MDA	701.702	241.642	68.229
Radium-226 RES	0.737	ND	ND
Radium-226 CU	0.281	0.085	0.222
Radium-226 MDA	0.115	0.121	0.283
Radium-228 RES	1.272	ND	ND
Radium-228 CU	0.573	0.387	0.490
Radium-228 MDA	1.072	0.775	0.967
Technetium-99 RES	3.881	ND	ND
Technetium-99 CU	1.572	0.866	1.040
Technetium-99 MDA	2.556	1.478	1.834
Thallium-208 RES	ND	ND	ND
Thallium-208 CU	8.069	3.473	1.274
Thallium-208 MDA	15.770	5.278	2.461
Thorium-227 RES	ND	ND	ND
Thorium-227 CU	0.057	0.040	0.035
Thorium-227 MDA	0.101	0.087	0.075
Thorium-228 RES	0.211	0.117	0.160
Thorium-228 CU	0.122	0.087	0.094
Thorium-228 MDA	0.080	0.086	0.074
Thorium-230 RES	0.568	0.264	0.194
Thorium-230 CU	0.209	0.129	0.103
Thorium-230 MDA	0.078	0.068	0.073
Thorium-232 RES	0.406	0.096	0.131
Thorium-232 CU	0.172	0.075	0.082
Thorium-232 MDA	0.068	0.059	0.051
Thorium-234 RES	ND	22.651	ND
Thorium-234 CU	70.158	14.419	7.304
Thorium-234 MDA	113.678	22.480	12.209
Uranium-234 RES	2.069	0.280	0.409
Uranium-234 CU	0.456	0.117	0.144
Uranium-234 MDA	0.113	0.062	0.076
Uranium-235 RES	ND	ND	0.072
Uranium-235 CU	0.054	0.030	0.066
Uranium-235 MDA	0.139	0.070	0.062
Uranium-238 RES	2.083	0.303	0.324
Uranium-238 CU	0.457	0.122	0.128
Uranium-238 MDA	0.121	0.062	0.076

Notes: Units in picocuries per gram (pCi/g). Sample analysis performed by Eberline Services. RES = reported analytical result. CU = Uncertainty (+/-). MDA = Minimum Detectable Activity. RES < MDA presented as non-detect (ND). "Impacted" sample results are highlighted in red and are defined as: Uranium and its isotopes ≥ 2 pCi/g, Radium-226/Radium-228 ≥ 2 pCi/g, Thorium-230 ≥ 2 pCi/g, Lead-210 or Polonium-210 ≥ 10 pCi/g, OR Transuranics present in any detectable concentration > the combined uncertainty (UNC) and minimum detectable activity (MDA).

Summary of Soil Analytical Results
 ID: 77746
 Multi-Sampling Project
 City of Metropolis-owned Properties

Sample ID	MET20200101S	MET20200102S	MET2022-024S	MET2022-004S	MET2022-005S DO	MET2022-006S DUP
Media	Soil	Soil	Soil	Soil	Soil	Soil
Description	Metrop. Muni. Airport NE	Metrop. Muni. Airport S near HWY	Metropolis Library - 317 Metropolis Street	634 Public Works Dr.	2004 Metropolis St. DO	2004 Metropolis St. DUP
Actinium-228 RES			1.106	0.930	1.372	1.388
Actinium-228 CU			0.248	0.223	0.277	0.332
Actinium-228 MDA			0.405	0.493	0.570	0.411
Americium-241 RES	ND	ND				
Americium-241 CU	0.049	0.068				
Americium-241 MDA	0.101	0.135				
Bismuth-214 RES			0.852	0.929	1.130	1.008
Bismuth-214 CU			0.194	0.192	0.210	0.307
Bismuth-214 MDA			0.291	0.276	0.341	0.515
Cesium-134 RES			ND	ND	ND	ND
Cesium-134 CU			0.036	0.025	0.024	0.036
Cesium-134 MDA			0.110	0.115	0.139	0.185
Cesium-137 RES			ND	ND	ND	ND
Cesium-137 CU			0.095	0.067	0.101	0.117
Cesium-137 MDA			0.157	0.111	0.162	0.191
Cobalt-60 RES			ND	ND	ND	ND
Cobalt-60 CU			0.054	0.063	0.075	0.141
Cobalt-60 MDA			0.096	0.089	0.095	0.184
Lead-210 RES			6.718	1.521	1.675	1.065
Lead-210 CU			0.466	0.365	0.366	0.374
Lead-210 MDA			0.429	0.613	0.576	0.669
Lead-212 RES			1.177	1.436	1.577	1.723
Lead-212 CU			0.236	0.241	0.213	0.292
Lead-212 MDA			0.326	0.318	0.326	0.327
Lead-214 RES			1.115	0.887	1.068	1.046
Lead-214 CU			0.197	0.189	0.191	0.262
Lead-214 MDA			0.319	0.307	0.287	0.418
Neptunium-237 RES	ND	ND				
Neptunium-237 CU	0.067	0.070				
Neptunium-237 MDA	0.237	0.222				
Plutonium-238 RES	ND	ND	0.302	0.458	0.522	0.469
Plutonium-238 CU	0.338	0.091	0.156	0.191	0.194	0.185
Plutonium-238 MDA	0.450	0.343	0.085	0.120	0.093	0.076
Plutonium-239/240 RES	ND	ND	ND	ND	ND	ND
Plutonium-239/240 CU	0.337	0.096	0.057	0.039	0.061	0.062
Plutonium-239/240 MDA	0.450	0.376	0.085	0.100	0.100	0.076
Polonium-210 RES			6.718	1.521	1.675	1.065
Polonium-210 CU			0.466	0.365	0.366	0.374
Polonium-210 MDA			0.429	0.613	0.576	0.669
Potassium-40 RES			8.233	4.203	11.549	11.776
Potassium-40 CU			1.620	1.224	1.877	2.186
Potassium-40 MDA			1.716	1.608	1.534	0.671
Protactinium-234m RES			ND	ND	ND	ND
Protactinium-234m CU			6.311	6.071	8.032	9.937
Protactinium-234m MDA			10.524	10.615	11.248	18.361
Radium-226 RES			0.900	1.381	1.261	0.954
Radium-226 CU			0.388	0.444	0.484	0.395
Radium-226 MDA			0.305	0.203	0.226	0.174
Radium-228 RES			1.454	1.233	1.300	0.973
Radium-228 CU			0.414	0.459	0.518	0.409
Radium-228 MDA			0.715	0.834	0.970	0.758
Technetium-99 RES	1.437	1.213	ND	ND	ND	ND
Technetium-99 CU	0.811	0.625	0.696	0.810	1.000	0.750
Technetium-99 MDA	1.339	1.027	1.168	1.383	1.753	1.289
Thallium-208 RES			0.731	0.796	1.048	1.222
Thallium-208 CU			0.192	0.254	0.238	0.319
Thallium-208 MDA			0.349	0.355	0.423	0.451
Thorium-227 RES	0.113	0.216	ND	0.047	ND	0.054
Thorium-227 CU	0.099	0.151	0.026	0.052	0.043	0.050
Thorium-227 MDA	0.110	0.145	0.063	0.070	0.093	0.047
Thorium-228 RES	1.408	1.105	0.769	0.701	0.815	0.713
Thorium-228 CU	0.410	0.382	0.233	0.208	0.264	0.206
Thorium-228 MDA	0.158	0.139	0.078	0.070	0.081	0.054
Thorium-230 RES	1.501	2.017	0.621	0.551	0.815	0.554
Thorium-230 CU	0.426	0.578	0.202	0.178	0.261	0.174
Thorium-230 MDA	0.166	0.129	0.067	0.064	0.073	0.052
Thorium-232 RES	1.292	1.607	0.790	0.804	0.826	0.724
Thorium-232 CU	0.382	0.489	0.235	0.225	0.263	0.206
Thorium-232 MDA	0.122	0.128	0.053	0.054	0.080	0.062
Thorium-234 RES			ND	ND	ND	ND
Thorium-234 CU			2.512	1.807	1.795	2.097
Thorium-234 MDA			4.182	2.809	2.621	3.501
Uranium-234 RES	1.436	3.938	0.861	0.977	0.654	0.533
Uranium-234 CU	0.339	0.621	0.237	0.232	0.191	0.170
Uranium-234 MDA	0.117	0.067	0.079	0.064	0.068	0.080
Uranium-235 RES	0.187	0.405	ND	ND	ND	ND
Uranium-235 CU	0.126	0.184	0.073	0.030	0.044	0.043
Uranium-235 MDA	0.129	0.112	0.077	0.063	0.096	0.094
Uranium-238 RES	1.472	3.790	0.807	0.805	0.601	0.353
Uranium-238 CU	0.332	0.604	0.229	0.208	0.182	0.135
Uranium-238 MDA	0.126	0.077	0.090	0.059	0.068	0.053

Notes: Units in picocuries per gram (pCi/g). Sample analysis performed by Eberline Services. RES = reported analytical result. CU = Uncertainty (+/-). MDA = Minimum Detectable Activity. RES < MDA presented as non-detect (ND). "Impacted" sample results are highlighted in red and are defined as: Uranium and its isotopes ≥ 2 pCi/g, Radium-226/Radium-228 ≥ 2 pCi/g, Thorium-230 ≥ 2 pCi/g, Lead-210 or Polonium-210 ≥ 10 pCi/g, OR Transuranics present in any detectable concentration > the combined uncertainty (UNC) and minimum detectable activity (MDA).

ID# 77717
Plaintiff Sampling Program

Sample ID	MET2022-027S	MET2022-028S	MET2022-029S	MET2023-001SD	MET2023-004S	MET2023-005S
Media	Soil	Soil	Soil	Soil	Soil	Soil
Description	Airport North	Airport Central	Airport South	DUPLICATE of MET2023-001S, 634 Public Works Drive	WWTP "old" sewage sludge circa Feb/March 2022	WWTP sewage sludge, circa January 2023
Actinium-228 RES	1.499	2.099	1.387	0.354	1.651	1.226
Actinium-228 CU	0.316	0.577	0.421	0.192	0.381	0.529
Actinium-228 MDA	0.447	1.398	0.917	0.305	0.766	1.189
Americium-241 RES						
Americium-241 CU						
Americium-241 MDA						
Bismuth-214 RES	0.983	1.617	1.010	0.642	0.857	1.136
Bismuth-214 CU	0.256	0.371	0.253	0.153	0.193	0.310
Bismuth-214 MDA	0.384	0.548	0.440	0.090	0.408	0.278
Cesium-134 RES	ND	ND	ND	ND	ND	ND
Cesium-134 CU	0.049	0.073	0.048	0.076	0.025	0.065
Cesium-134 MDA	0.152	0.235	0.160	0.058	0.148	0.163
Cesium-137 RES	0.269	ND	ND	ND	ND	ND
Cesium-137 CU	0.123	0.195	0.107	0.050	0.087	0.150
Cesium-137 MDA	0.186	0.524	0.168	0.081	0.142	0.222
Cobalt-60 RES	ND	ND	ND	ND	ND	ND
Cobalt-60 CU	0.077	0.162	0.123	0.054	0.094	0.160
Cobalt-60 MDA	0.123	0.271	0.149	0.076	0.156	0.197
Lead-210 RES	1.013	1.453	1.619	0.753	2.263	2.254
Lead-210 CU	0.346	0.342	0.364	0.312	0.366	0.363
Lead-210 MDA	0.631	0.566	0.606	0.581	0.543	0.532
Lead-212 RES	1.901	2.058	2.231	0.264	1.230	0.852
Lead-212 CU	0.235	0.400	0.339	0.066	0.567	0.242
Lead-212 MDA	0.381	0.504	0.403	0.132	0.313	0.414
Lead-214 RES	1.486	1.626	1.650	0.630	1.159	0.838
Lead-214 CU	0.225	0.368	0.303	0.142	0.375	0.304
Lead-214 MDA	0.361	0.570	0.499	0.204	0.431	0.563
Neptunium-237 RES						
Neptunium-237 CU						
Neptunium-237 MDA						
Plutonium-238 RES	0.454	0.465	0.381	ND	0.370	0.368
Plutonium-238 CU	0.195	0.221	0.177	0.046	0.188	0.196
Plutonium-238 MDA	0.087	0.143	0.119	0.108	0.185	0.133
Plutonium-239/240 RES	ND	ND	ND	ND	ND	ND
Plutonium-239/240 CU	0.058	0.071	0.059	0.063	0.051	0.051
Plutonium-239/240 MDA	0.125	0.121	0.146	0.095	0.197	0.121
Polonium-210 RES	1.013	1.453	1.619			
Polonium-210 CU	0.346	0.342	0.364			
Polonium-210 MDA	0.631	0.566	0.606			
Potassium-40 RES	15.005	18.315	17.237	7.055	8.827	10.119
Potassium-40 CU	2.212	3.435	2.794	1.359	2.116	2.844
Potassium-40 MDA	1.423	2.409	2.628	1.094	2.471	2.918
Protactinium-234m RES	ND	ND	ND	ND	ND	ND
Protactinium-234m CU	7.644	14.637	9.835	4.959	6.869	14.713
Protactinium-234m MDA	13.853	24.006	16.864	7.135	12.640	23.195
Radium-226 RES	1.304	1.282	1.466	0.197	1.638	0.991
Radium-226 CU	0.533	0.448	0.477	0.163	0.582	0.469
Radium-226 MDA	0.393	0.294	0.166	0.176	0.387	0.268
Radium-228 RES	1.009	1.170	1.349	ND	ND	ND
Radium-228 CU	0.493	0.434	0.400	0.533	1.200	1.690
Radium-228 MDA	0.942	0.801	0.685	1.047	2.491	3.408
Technetium-99 RES	ND	ND	ND	ND	ND	ND
Technetium-99 CU	0.902	0.700	0.979	0.488	0.816	0.628
Technetium-99 MDA	1.582	1.193	1.675	0.846	1.426	1.084
Thallium-208 RES	1.020	1.173	1.567	0.221	0.788	0.970
Thallium-208 CU	0.272	0.394	0.361	0.103	0.239	0.420
Thallium-208 MDA	0.452	0.643	0.662	0.058	0.448	0.708
Thorium-227 RES	ND	ND	ND	ND	ND	ND
Thorium-227 CU	0.038	0.052	0.046	0.043	0.064	0.034
Thorium-227 MDA	0.070	0.078	0.105	0.101	0.155	0.071
Thorium-228 RES	0.627	0.892	1.258	ND	1.460	0.891
Thorium-228 CU	0.207	0.256	0.356	0.104	0.460	0.288
Thorium-228 MDA	0.080	0.068	0.117	0.162	0.162	0.094
Thorium-230 RES	0.818	1.045	0.885	0.141	0.852	0.672
Thorium-230 CU	0.242	0.282	0.279	0.111	0.318	0.240
Thorium-230 MDA	0.054	0.076	0.098	0.086	0.127	0.079
Thorium-232 RES	0.684	0.890	0.873	0.261	0.921	0.638
Thorium-232 CU	0.216	0.254	0.275	0.156	0.333	0.232
Thorium-232 MDA	0.062	0.076	0.087	0.098	0.111	0.079
Thorium-234 RES	ND	ND	4.928	ND	ND	ND
Thorium-234 CU	2.086	3.523	2.390	0.544	2.104	3.016
Thorium-234 MDA	3.174	9.690	3.829	0.929	3.395	4.995
Uranium-234 RES	0.820	0.927	0.890	0.285	2.081	1.693
Uranium-234 CU	0.225	0.240	0.199	0.121	0.446	0.368
Uranium-234 MDA	0.068	0.091	0.059	0.060	0.101	0.100
Uranium-235 RES	0.085	0.134	0.110	ND	ND	0.222
Uranium-235 CU	0.077	0.096	0.076	0.043	0.048	0.135
Uranium-235 MDA	0.073	0.071	0.073	0.065	0.113	0.085
Uranium-238 RES	0.818	1.450	1.145	0.153	1.522	1.491
Uranium-238 CU	0.227	0.308	0.230	0.090	0.369	0.341
Uranium-238 MDA	0.097	0.066	0.059	0.075	0.100	0.099

Sample ID	MET2023-01SSD DUP	MET2023-016S	MET2023-017S	MET2023-018S	MET2023-020S	MET2023-020SD
Media	Soil	Soil	Soil	Soil	Soil	Soil
Description	DUPLICATE of MET2023-01SS	soil sample, central, 1500 and 1602 Metropolis St., Am. Leg. Park	soil sample just NW of SE parking lot area, 1500 and 1602 Metropolis St., Am. Leg. Park	soil sample north side of concrete paved basketball court, 1804 Metropolis St	soil in west field, Metropolis Sport Park	DUPLICATE of MET2023-020S, Metropolis Sport Park
Actinium-228 RES	1.178	1.374	0.814	0.921	1.339	1.758
Actinium-228 CU	0.465	0.381	0.261	0.287	0.318	0.462
Actinium-228 MDA	1.168	0.587	0.628	0.543	0.405	0.958
Americium-241 RES						
Americium-241 CU						
Americium-241 MDA						
Bismuth-214 RES	1.489	1.166	0.955	0.747	1.145	1.303
Bismuth-214 CU	0.312	0.253	0.188	0.179	0.239	0.299
Bismuth-214 MDA	0.453	0.328	0.307	0.237	0.242	0.489
Cesium-134 RES	ND	ND	ND	ND	ND	ND
Cesium-134 CU	0.052	0.126	0.033	0.081	0.028	0.046
Cesium-134 MDA	0.203	0.101	0.116	0.134	0.080	0.191
Cesium-137 RES	ND	ND	ND	ND	ND	ND
Cesium-137 CU	0.123	0.082	0.085	0.139	0.091	0.128
Cesium-137 MDA	0.224	0.137	0.122	0.232	0.147	0.212
Cobalt-60 RES	ND	ND	ND	ND	ND	ND
Cobalt-60 CU	0.054	0.078	0.076	0.086	0.070	0.113
Cobalt-60 MDA	0.159	0.119	0.078	0.130	0.112	0.195
Lead-210 RES	0.985	1.395	1.759	5.703	1.382	2.374
Lead-210 CU	0.319	0.356	0.307	0.528	0.389	0.499
Lead-210 MDA	0.566	0.611	0.438	0.575	0.670	0.826
Lead-212 RES	1.885	1.312	1.033	1.381	1.349	1.379
Lead-212 CU	0.351	0.259	0.155	0.256	0.248	0.282
Lead-212 MDA	0.429	0.288	0.212	0.338	0.338	0.375
Lead-214 RES	1.108	1.245	0.916	1.028	1.092	0.931
Lead-214 CU	0.282	0.323	0.146	0.231	0.271	0.278
Lead-214 MDA	0.523	0.385	0.383	0.370	0.311	0.456
Neptunium-237 RES						
Neptunium-237 CU						
Neptunium-237 MDA						
Plutonium-238 RES	0.313	0.285	0.146	0.470	0.330	0.364
Plutonium-238 CU	0.143	0.153	0.100	0.235	0.159	0.162
Plutonium-238 MDA	0.084	0.112	0.081	0.174	0.110	0.093
Plutonium-239/240 RES	ND	ND	ND	ND	ND	ND
Plutonium-239/240 CU	0.032	0.041	0.058	0.097	0.036	0.036
Plutonium-239/240 MDA	0.077	0.104	0.089	0.182	0.077	0.085
Polonium-210 RES						
Polonium-210 CU						
Polonium-210 MDA						
Potassium-40 RES	11.128	7.060	11.332	14.744	11.375	15.385
Potassium-40 CU	2.262	1.538	1.789	2.081	1.873	2.787
Potassium-40 MDA	0.673	1.130	1.222	0.923	0.984	1.920
Protactinium-234m RES	ND	ND	ND	ND	ND	ND
Protactinium-234m CU	12.009	8.167	6.864	8.798	8.022	10.486
Protactinium-234m MDA	22.530	14.540	12.459	13.762	13.420	18.452
Radium-226 RES	0.458	0.626	ND	0.755	0.493	0.320
Radium-226 CU	0.247	0.309	0.110	0.322	0.280	0.244
Radium-226 MDA	0.160	0.232	0.134	0.167	0.207	0.246
Radium-228 RES	ND	ND	0.926	ND	0.906	ND
Radium-228 CU	0.438	0.417	0.472	0.438	0.432	0.346
Radium-228 MDA	0.845	0.867	0.905	0.899	0.813	0.671
Technetium-99 RES	ND	ND	ND	ND	ND	ND
Technetium-99 CU	0.480	0.629	0.513	0.656	0.613	0.778
Technetium-99 MDA	0.819	1.072	0.882	1.130	1.041	1.336
Thallium-208 RES	0.991	1.044	0.884	0.867	1.261	1.120
Thallium-208 CU	0.338	0.274	0.212	0.203	0.247	0.315
Thallium-208 MDA	0.553	0.075	0.423	0.188	0.060	0.284
Thorium-227 RES	0.076	ND	0.069	ND	ND	ND
Thorium-227 CU	0.066	0.030	0.064	0.070	0.028	0.057
Thorium-227 MDA	0.064	0.078	0.059	0.098	0.058	0.085
Thorium-228 RES	0.894	1.134	0.605	0.727	1.034	0.824
Thorium-228 CU	0.260	0.319	0.209	0.248	0.288	0.270
Thorium-228 MDA	0.070	0.108	0.089	0.132	0.065	0.096
Thorium-230 RES	0.764	0.878	0.486	0.831	0.694	0.913
Thorium-230 CU	0.233	0.266	0.182	0.267	0.222	0.286
Thorium-230 MDA	0.069	0.069	0.083	0.121	0.071	0.083
Thorium-232 RES	1.008	0.900	0.425	0.996	1.083	0.819
Thorium-232 CU	0.280	0.271	0.167	0.296	0.296	0.266
Thorium-232 MDA	0.074	0.081	0.066	0.063	0.071	0.076
Thorium-234 RES	ND	ND	ND	3.444	ND	ND
Thorium-234 CU	2.388	1.753	1.588	1.909	1.840	2.308
Thorium-234 MDA	4.246	2.649	2.474	3.066	3.083	4.301
Uranium-234 RES	0.740	0.680	0.402	0.776	0.804	0.814
Uranium-234 CU	0.211	0.185	0.151	0.206	0.197	0.196
Uranium-234 MDA	0.073	0.056	0.072	0.060	0.066	0.051
Uranium-235 RES	ND	0.116	ND	0.091	ND	ND
Uranium-235 CU	0.036	0.086	0.075	0.075	0.038	0.052
Uranium-235 MDA	0.102	0.087	0.101	0.065	0.057	0.080
Uranium-238 RES	0.759	0.645	0.395	0.513	0.745	0.558
Uranium-238 CU	0.214	0.180	0.150	0.164	0.188	0.160
Uranium-238 MDA	0.083	0.049	0.082	0.052	0.046	0.064

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Summary of Soil Analytical Results
 Multi-Sampling Program
 City of Metropolis-owned Properties

Sample ID	MET2023-062S	MET2023-107SD	Honeywell Sample 3 (ARN MASS003-00-05)	Honeywell Sample 4 (ARN MASS004-00-05)	ARN MASS005-00-05 (Honeywell Sample 5)	ARN MASS009-00-05 (Honeywell Sample 14)
Media	Soil	Soil	Soil	Soil	Soil	Soil
Description	Lincoln Park	Duplicate sample of MET2023-106S, 751 Airport Rd, Metropolis	Library Park-221 Market St.	Metropolis Water Treatment-634 Public Works Dr.	Soccer Complex	Airport Center
Actinium-228 RES	2.261	1.700	0.949	1.27	0.82	1.12
Actinium-228 CU	0.577	0.344	0.208	0.221	0.226	0.248
Actinium-228 MDA	1.068	0.595	0.154	0.166	0.187	0.15
Americium-241 RES						
Americium-241 CU						
Americium-241 MDA						
Bismuth-214 RES	1.267	1.382	0.915	1.01	0.889	1.01
Bismuth-214 CU	0.404	0.267	0.135	0.16	0.126	0.138
Bismuth-214 MDA	0.275	0.418	0.0714	0.0882	0.0797	0.0827
Cesium-134 RES	ND	ND				
Cesium-134 CU	0.068	0.118				
Cesium-134 MDA	0.256	0.149				
Cesium-137 RES	ND	ND	0.147			0.199
Cesium-137 CU	0.292	0.119	0.0747			0.0726
Cesium-137 MDA	0.478	0.190	0.0496			0.0502
Cobalt-60 RES	ND	ND				
Cobalt-60 CU	0.073	0.091				
Cobalt-60 MDA	0.245	0.131				
Lead-210 RES	1.677	1.994	1.29	2.59	0.844	1.07
Lead-210 CU	0.364	0.539	0.204	0.282	0.156	0.16
Lead-210 MDA	0.585	0.951	0.162	0.167	0.16	0.17
Lead-212 RES	2.084	1.867				
Lead-212 CU	0.401	0.292				
Lead-212 MDA	0.486	0.378				
Lead-214 RES	1.295	1.336	1.09	1.55	0.817	1.14
Lead-214 CU	0.387	0.203	0.146	0.172	0.136	0.164
Lead-214 MDA	0.714	0.592	0.0964	0.095	0.0907	0.0917
Neptunium-237 RES						
Neptunium-237 CU						
Neptunium-237 MDA						
Plutonium-238 RES	0.467	ND	ND	ND	ND	ND
Plutonium-238 CU	0.212	0.061	0.0251	0.0512	0.0397	0.0291
Plutonium-238 MDA	0.114	0.103	0.0582	0.0861	0.0829	0.0817
Plutonium-239/240 RES	0.020	0.000	-0.00582	0	-0.00976	0.0438
Plutonium-239/240 CU	0.047	0.060	0.0257	0.0362	0.0295	0.0599
Plutonium-239/240 MDA	0.099	0.129	0.0671	0.0538	0.0828	0.0817
Polonium-210 RES						
Polonium-210 CU						
Polonium-210 MDA						
Potassium-40 RES	18.341	17.657	7.59	6.06	8.04	11
Potassium-40 CU	3.413	2.445	0.969	0.937	0.907	1.14
Potassium-40 MDA	0.892	1.750	0.454	0.577	0.435	0.521
Protactinium-234m RES	ND	ND				
Protactinium-234m CU	16.256	7.436				
Protactinium-234m MDA	28.062	11.660				
Radium-226 RES	0.642	0.990	0.755	1.01	0.748	0.893
Radium-226 CU	0.330	0.338	0.266	0.253	0.216	0.136
Radium-226 MDA	0.181	0.141	0.151	0.104	0.114	0.0571
Radium-228 RES	0.916	1.251				
Radium-228 CU	0.416	0.448				
Radium-228 MDA	0.777	0.819				
Technetium-99 RES	ND	ND	2.79	ND	2.48	ND
Technetium-99 CU	0.744	0.873	1.43	1.33	1.35	1.38
Technetium-99 MDA	1.315	1.451	2.34	2.22	2.22	2.29
Thallium-208 RES	1.054	1.451				
Thallium-208 CU	0.515	0.407				
Thallium-208 MDA	1.033	0.565				
Thorium-227 RES	0.078	ND				
Thorium-227 CU	0.066	0.026				
Thorium-227 MDA	0.056	0.055				
Thorium-228 RES	1.220	1.021	1.04	1.16	1	0.892
Thorium-228 CU	0.321	0.283	0.242	0.267	0.186	0.219
Thorium-228 MDA	0.070	0.069	0.203	0.175	0.0824	0.195
Thorium-230 RES	1.124	0.890	1.05	1.11	0.937	1.24
Thorium-230 CU	0.301	0.257	0.23	0.253	0.183	0.234
Thorium-230 MDA	0.055	0.077	0.162	0.158	0.123	0.132
Thorium-232 RES	1.137	0.734	0.75	0.932	0.809	1.05
Thorium-232 CU	0.305	0.227	0.187	0.23	0.165	0.21
Thorium-232 MDA	0.078	0.077	0.0921	0.134	0.0818	0.0542
Thorium-234 RES	ND	ND	ND	ND	ND	ND
Thorium-234 CU	2.788	2.416	1.74	2.92	2.15	2.52
Thorium-234 MDA	4.625	4.037	2.26	2.11	1.89	2.32
Uranium-234 RES	1.282	1.187	0.937	1.04	0.765	1.33
Uranium-234 CU	0.356	0.253	0.14	0.216	0.157	0.169
Uranium-234 MDA	0.091	0.061	0.0652	0.101	0.0797	0.0488
Uranium-235 RES	0.188	0.087	0.0511	ND	ND	0.119
Uranium-235 CU	0.150	0.075	0.0396	0.0738	0.0357	0.0588
Uranium-235 MDA	0.161	0.086	0.0192	0.0806	0.057	0.0399
Uranium-238 RES	1.044	1.002	0.981	1.25	0.711	1.4
Uranium-238 CU	0.319	0.229	0.141	0.233	0.148	0.174
Uranium-238 MDA	0.130	0.049	0.0395	0.0652	0.0461	0.0518

Sample ID	ARN MASS010-00-05 (Honeywell Sample 15)
Media	Soil
Description	Airport South
Actinium-228 RES	1.02
Actinium-228 CU	0.225
Actinium-228 MDA	0.209
Americium-241 RES	
Americium-241 CU	
Americium-241 MDA	
Bismuth-214 RES	0.979
Bismuth-214 CU	0.147
Bismuth-214 MDA	0.113
Cesium-134 RES	
Cesium-134 CU	
Cesium-134 MDA	
Cesium-137 RES	
Cesium-137 CU	
Cesium-137 MDA	
Cobalt-60 RES	
Cobalt-60 CU	
Cobalt-60 MDA	
Lead-210 RES	0.952
Lead-210 CU	0.153
Lead-210 MDA	0.126
Lead-212 RES	
Lead-212 CU	
Lead-212 MDA	
Lead-214 RES	1.27
Lead-214 CU	0.163
Lead-214 MDA	0.104
Neptunium-237 RES	
Neptunium-237 CU	
Neptunium-237 MDA	
Plutonium-238 RES	ND
Plutonium-238 CU	0.0272
Plutonium-238 MDA	0.0764
Plutonium-239/240 RES	0.035
Plutonium-239/240 CU	0.0567
Plutonium-239/240 MDA	0.0877
Polonium-210 RES	
Polonium-210 CU	
Polonium-210 MDA	
Potassium-40 RES	14.2
Potassium-40 CU	1.3
Potassium-40 MDA	0.478
Protactinium-234m RES	
Protactinium-234m CU	
Protactinium-234m MDA	
Radium-226 RES	0.9
Radium-226 CU	0.25
Radium-226 MDA	0.0968
Radium-228 RES	
Radium-228 CU	
Radium-228 MDA	
Technetium-99 RES	6.3
Technetium-99 CU	1.93
Technetium-99 MDA	3.08
Thallium-208 RES	
Thallium-208 CU	
Thallium-208 MDA	
Thorium-227 RES	
Thorium-227 CU	
Thorium-227 MDA	
Thorium-228 RES	1.33
Thorium-228 CU	0.228
Thorium-228 MDA	0.152
Thorium-230 RES	1.04
Thorium-230 CU	0.2
Thorium-230 MDA	0.143
Thorium-232 RES	1.07
Thorium-232 CU	0.193
Thorium-232 MDA	0.0858
Thorium-234 RES	ND
Thorium-234 CU	2.71
Thorium-234 MDA	2.39
Uranium-234 RES	1.51
Uranium-234 CU	0.15
Uranium-234 MDA	0.0533
Uranium-235 RES	0.0839
Uranium-235 CU	0.0429
Uranium-235 MDA	0.0357
Uranium-238 RES	1.58
Uranium-238 CU	0.153
Uranium-238 MDA	0.0417

	Sample ID	MET2022-0648	MET2022-065B	MET2022-068B	MET2022-071B
	Media	Dust	Dust	Dust	Dust
	Description	Massac Co. Fire Dpt., shopvac contents	Massac Co. Fire Dpt., contents of dust pan, 2/8/2023	HHO Carbon Clean Systems, Vacuum collection chamber contents	Massac Co. Courthouse, vacuum cleaner bag & contents
Actinium-228	RES	ND	ND	ND	0.659
Actinium-228	CU	0.349	1.960	4.207	0.321
Actinium-228	MDA	0.617	3.509	8.333	0.399
Americium-241	RES				
Americium-241	CU				
Americium-241	MDA				
Americium-243	RES				
Americium-243	CU				
Americium-243	MDA				
Bismuth-214	RES	0.833	3.792	ND	0.665
Bismuth-214	CU	0.204	1.667	3.202	0.324
Bismuth-214	MDA	0.298	2.370	5.147	0.464
Cesium-134	RES	ND	ND	ND	ND
Cesium-134	CU	0.043	0.704	2.297	0.117
Cesium-134	MDA	0.139	0.635	2.258	0.148
Cesium-137	RES	0.176	ND	ND	ND
Cesium-137	CU	0.092	0.599	1.601	0.134
Cesium-137	MDA	0.137	0.952	2.737	0.234
Cobalt-60	RES	ND	ND	ND	ND
Cobalt-60	CU	0.087	0.573	1.515	0.137
Cobalt-60	MDA	0.108	0.772	2.234	0.160
Lead-210	RES	ND	1.161	6.302	ND
Lead-210	CU	0.820	0.407	0.786	0.437
Lead-210	MDA	1.660	0.752	1.047	0.893
Lead-212	RES	0.603	ND	ND	ND
Lead-212	CU	0.198	1.183	2.397	0.154
Lead-212	MDA	0.296	1.923	3.613	0.246
Lead-214	RES	0.716	3.436	ND	ND
Lead-214	CU	0.270	1.409	3.013	0.232
Lead-214	MDA	0.407	2.575	4.829	0.404
Neptunium-237	RES				
Neptunium-237	CU				
Neptunium-237	MDA				
Plutonium-238	RES	ND	ND	ND	ND
Plutonium-238	CU	0.086	0.056	0.055	0.044
Plutonium-238	MDA	0.090	0.077	0.178	0.065
Plutonium-239/240	RES	ND	ND	ND	ND
Plutonium-239/240	CU	0.043	0.026	0.050	0.044
Plutonium-239/240	MDA	0.090	0.061	0.104	0.082
Polonium-210	RES				
Polonium-210	CU				
Polonium-210	MDA				
Potassium-40	RES	7.123	12.503	ND	2.598
Potassium-40	CU	1.737	7.052	17.099	1.747
Potassium-40	MDA	1.857	10.311	35.510	2.517
Protactinium-234m	RES	ND	ND	ND	ND
Protactinium-234m	CU	8.075	41.782	130.550	13.386
Protactinium-234m	MDA	11.665	98.417	266.469	21.623
Radium-226	RES	ND	ND	ND	0.192
Radium-226	CU	0.632	0.237	0.147	0.164
Radium-226	MDA	0.962	0.301	0.476	0.162
Radium-228	RES	ND	ND	ND	0.785
Radium-228	CU	1.185	0.721	0.665	0.408
Radium-228	MDA	2.437	1.445	1.375	0.778
Technetium-99	RES	ND	ND	ND	ND
Technetium-99	CU	0.908	0.760	0.591	0.752
Technetium-99	MDA	1.591	1.302	1.046	1.309
Thallium-208	RES	0.371	ND	ND	ND
Thallium-208	CU	0.193	1.280	3.470	0.245
Thallium-208	MDA	0.361	2.571	6.483	0.494
Thorium-227	RES	ND	ND	ND	ND
Thorium-227	CU	0.055	0.081	0.077	0.064
Thorium-227	MDA	0.075	0.100	0.117	0.077
Thorium-228	RES	0.504	ND	ND	ND
Thorium-228	CU	0.197	0.057	0.089	0.032
Thorium-228	MDA	0.094	0.079	0.139	0.067
Thorium-230	RES	0.567	0.137	0.181	0.076
Thorium-230	CU	0.208	0.099	0.132	0.070
Thorium-230	MDA	0.064	0.085	0.123	0.065
Thorium-232	RES	0.353	ND	ND	ND
Thorium-232	CU	0.160	0.056	0.087	0.044
Thorium-232	MDA	0.092	0.091	0.122	0.075
Thorium-234	RES	3.119	12.214	ND	ND
Thorium-234	CU	1.769	6.210	24.807	1.345
Thorium-234	MDA	2.928	11.411	39.478	2.212
Uranium-234	RES	0.807	0.160	0.324	0.085
Uranium-234	CU	0.350	0.081	0.188	0.067
Uranium-234	MDA	0.195	0.049	0.194	0.072
Uranium-235	RES	0.249	0.074	0.158	ND
Uranium-235	CU	0.208	0.061	0.136	0.041
Uranium-235	MDA	0.178	0.053	0.134	0.088
Uranium-238	RES	0.857	0.160	0.234	0.058
Uranium-238	CU	0.357	0.081	0.149	0.053
Uranium-238	MDA	0.144	0.049	0.128	0.050
Notes: Units in picocuries per gram (pCi/g). Sample analysis performed by Eberline Services. RES = reported analytical result. CU = Uncertainty (+/-). MDA = Minimum Detectable Activity. RES < MDA presented as non-detect (ND). "Impacted" sample results are highlighted in red and are defined as: Uranium and its isotopes ≥ 2 pCi/g, Radium-226/Radium-228 ≥ 2 pCi/g, Thorium-230 ≥ 2 pCi/g, Lead-210 or Polonium-210 ≥ 10 pCi/g, OR Transuranics present in any detectable concentration > the combined uncertainty (UNC) and minimum detectable activity (MDA).					

Notes: Units in picocuries per gram (pCi/g). Sample analysis performed by Eberline Services. RES = reported analytical result. CU = Uncertainty (+/-). MDA = Minimum Detectable Activity. RES < MDA indicates no detect (ND). "Impacted" sample results are highlighted in red and are defined as: Uranium and its isotopes ≥ 2 pCi/g, Radium-226/Radium-228 ≥ 2 pCi/g, Thorium-230 ≥ 2 pCi/g, Lead-210or Polonium-210 ≥ 10 pCi/g, OR Transuramics present in any detectable concentration \geq the combined uncertainty (UNC) and minimum detectable activity (MDA).

Summary of Soil Analytical Results
Public Hearing
ID # 571126
Massac County-owned Properties

Sample ID	ARN MASS020D-00-05 (Honeywell Sample 43)
Media	Soil
Description	1103 W 10th St.
Actinium-228 RES	1.010
Actinium-228 CU	0.277
Actinium-228 MDA	0.157
Americium-241 RES	
Americium-241 CU	
Americium-241 MDA	
Americium-243 RES	
Americium-243 CU	
Americium-243 MDA	
Bismuth-214 RES	0.915
Bismuth-214 CU	0.131
Bismuth-214 MDA	0.079
Cesium-134 RES	
Cesium-134 CU	
Cesium-134 MDA	
Cesium-137 RES	
Cesium-137 CU	
Cesium-137 MDA	
Cobalt-60 RES	
Cobalt-60 CU	
Cobalt-60 MDA	
Lead-210 RES	1.370
Lead-210 CU	0.151
Lead-210 MDA	0.138
Lead-212 RES	
Lead-212 CU	
Lead-212 MDA	
Lead-214 RES	1.040
Lead-214 CU	0.139
Lead-214 MDA	0.078
Neptunium-237 RES	
Neptunium-237 CU	
Neptunium-237 MDA	
Plutonium-238 RES	ND
Plutonium-238 CU	0.051
Plutonium-238 MDA	0.097
Plutonium-239/240 RES	ND
Plutonium-239/240 CU	0.061
Plutonium-239/240 MDA	0.097
Polonium-210 RES	
Polonium-210 CU	
Polonium-210 MDA	
Potassium-40 RES	12.900
Potassium-40 CU	1.080
Potassium-40 MDA	0.373
Protactinium-234m RES	
Protactinium-234m CU	
Protactinium-234m MDA	
Radium-226 RES	0.894
Radium-226 CU	0.261
Radium-226 MDA	0.106
Radium-228 RES	
Radium-228 CU	
Radium-228 MDA	
Technetium-99 RES	2.100
Technetium-99 CU	1.430
Technetium-99 MDA	2.370
Thallium-208 RES	
Thallium-208 CU	
Thallium-208 MDA	
Thorium-227 RES	
Thorium-227 CU	
Thorium-227 MDA	
Thorium-228 RES	0.896
Thorium-228 CU	0.183
Thorium-228 MDA	0.100
Thorium-230 RES	1.170
Thorium-230 CU	0.208
Thorium-230 MDA	0.126
Thorium-232 RES	1.050
Thorium-232 CU	0.190
Thorium-232 MDA	0.070
Thorium-234 RES	ND
Thorium-234 CU	1.640
Thorium-234 MDA	1.480
Uranium-234 RES	0.998
Uranium-234 CU	0.204
Uranium-234 MDA	0.123
Uranium-235 RES	ND
Uranium-235 CU	0.045
Uranium-235 MDA	0.072
Uranium-238 RES	0.953
Uranium-238 CU	0.192
Uranium-238 MDA	0.058

Expert Report of Marc Glass
September 26, 2023

APPENDIX D: OPINION OF PROBABLE COST

Site Assessment Program - Opinion of Probable Cost
City of Metropolis - Massac County, IL
Proposed Class Area (Illinois, 3-mile radius from Honeywell MTW)

Task 1: Preparatory Activities						
Item / Labor Category	Quantity	Units	Cost per unit	Subtotal	Markup %	Total
Sr Proj Mgr./ Const. Mgr.- SAWP, SSHSP prep / coordinate subs and labora	20	Hour	\$ 175.00	\$ 3,500.00	0.00	\$ 3,500.00
Project Manager - Job Scope, SSHP, SAWP	100	Hour	\$ 125.00	\$ 12,500.00	0.00	\$ 12,500.00
Supervisor/Staff Scientist - SAWP, SSHSP prep / coordinate subs and labora	150	Hour	\$ 90.00	\$ 13,500.00	0.00	\$ 13,500.00
QAPP	160	Hour	\$ 90.00	\$ 14,400.00	0.00	\$ 14,400.00
H&S Techician - Health and Safety Plan	100	Hour	\$ 75.00	\$ 7,500.00	0.00	\$ 7,500.00
Clerical - Administrative support	200	Hour	\$ 65.00	\$ 13,000.00	0.00	\$ 13,000.00
Pre-Construction Surveying	664	Property	\$ 550.00	\$ 364,957.02	0.00	\$ 364,957.02
Pre-Construction Site Inspection and data managemenet	200	Hour	\$ 90.00	\$ 18,000.00	0.00	\$ 18,000.00
Access Agreements (City-County)	2	Owner	\$ 1,250.00	\$ 2,500.00	0.00	\$ 2,500.00
ACAD Services	100	Property	\$ 50.00	\$ 5,000.00	0.00	\$ 5,000.00
TASK TOTAL						\$ 454,857
Task 2: Landfill Disposal Waste Permit						
Item / Labor Category	Quantity	Units	Cost per unit	Subtotal	Markup %	Total
Project Manager	4	Hour	\$ 125.00	\$ 500.00	0.00	\$ 500.00
Supervisor/Staff Scientist.- Permit prep/management through project	24	Hour	\$ 90.00	\$ 2,160.00	0.00	\$ 2,160.00
Staff Scientist - data compilation/landfill/PADEP corres	30	Hour	\$ 90.00	\$ 2,700.00	0.00	\$ 2,700.00
Permit fee (estimated)	1	Permit	\$ 500.00	\$ 500.00	0.00	\$ 500.00
Admin/Clerical	4	Hour	\$ 45.00	\$ 180.00	0.00	\$ 180.00
TASK TOTAL						\$ 6,040
Task 3: Temporary Facilities						
Item / Labor Category	Quantity	Units	Cost per unit	Subtotal	Markup %	Total
SeniorProject Manager	664	Hour	\$ 175.00	\$ 116,122.69	0.00	\$ 116,122.69
Mobilization / Demobilization	1	Each	\$ 2,900.00	\$ 2,900.00	0.00	\$ 2,900.00
Centralized staging area construction (Office Trailer, restrooms, storage traile	1	Each	\$ 10,000.00	\$ 10,000.00	0.00	\$ 10,000.00
Landfill waste characterization sampling analytical fees (at staging area)	3	Sample	\$ 1,691.75	\$ 5,075.25	0.00	\$ 5,075.25
Data Vallidation	40	Hour	\$ 175.00	\$ 7,000.00	0.00	\$ 7,000.00
Personel H&S monitoring	664	Property	\$ 115.00	\$ 76,309.20	0.00	\$ 76,309.20
E&S Controls/BMPs	664	Property	\$ 47.50	\$ 31,519.02	0.00	\$ 31,519.02
TASK TOTAL						\$ 248,926
Task 4: Site Assessment Sampling Program						
Item / Labor Category	Quantity	Units	Cost per unit	Subtotal	Markup %	Total
Site Assessment Sampling - Interior Dust	83	Property	\$ 15,342.88	\$ 1,278,613.40	0.00	\$ 1,278,613.40
Site Assessment Sampling - Exterior Soil	580	Property	\$ 7,982.88	\$ 4,631,841.66	0.00	\$ 4,631,841.66
Data Vallidation	664	Property	\$ 950.00	\$ 630,380.31	0.00	\$ 630,380.31
Staff Scientist -Confirmatory sampling Completion Report preparation/95% U	664	Property	\$ 90.00	\$ 59,720.24	0.00	\$ 59,720.24
Geodatabase management	995	Hour	\$ 125.00	\$ 124,417.17	0.00	\$ 124,417.17
Post-Construction Site Inspection and Data Management	664	Property	\$ 250.00	\$ 165,889.55	0.00	\$ 165,889.55
ACAD Services, post processing , mapping	664	Property	\$ 250.00	\$ 165,889.55	0.00	\$ 165,889.55
Background study sampling	4	Site	\$ 7,982.88	\$ 31,931.50	0.00	\$ 31,931.50
Physical parameters for modeling/Remedial Design analytical costs - soil (porosity, perm., hydraulic cond., % moisture, BD, TOC, particle size)	13	Sample	\$ 895.50	\$ 11,884.33	0.00	\$ 11,884.33
Clerical - data management, trackings, admin support	1327	Hour	\$ 45.00	\$ 59,720.24	0.00	\$ 59,720.24
Property Owner Reports data compilation	664	Property	\$ 250.00	\$ 165,889.55	0.00	\$ 165,889.55
Documents / Repro. Fees for Property Owner Reports and mailings.	664	Property	\$ 750.00	\$ 497,668.66	0.00	\$ 497,668.66
TASK TOTAL						\$ 7,823,846
Other						
Item / Labor Category	Quantity	Units	Cost per unit	Subtotal	Markup %	Total
Program Oversight	5%	Hour	\$ 403,638.62	\$ 403,638.62	0.00	\$ 403,638.62
Site Assessment Report	1	Report	\$ 27,500.00	\$ 27,500.00	0.00	\$ 27,500.00
Contingency	25%	Hour	\$ 2,133,417.33	\$ 2,133,417.33	0.00	\$ 2,133,417.33
TASK TOTAL						\$ 2,564,556
Total						\$ 11,098,225.28
PER PROPERTY						\$ 16,725

Notes/Assumptions:

Estimate provided as Opinion of Probable Cost prior to complete site assessment of the Class Area.
Per diem expenses are not included in opinion due to regional availability of qualified service providers.
Cost opinion does not include expenses for additional remediation pending review of confirmatory sampling program results.
Property is defined as number of assessment units for cost estimation purposes.

Assessment Units

Soil Assessment Units For parcels larger than 1-acre, divide sf/acre*2; for parcel 10,000 sf to 1-acre, divide by 10k sf
Structure Assessment Units For structure larger than 10, 000 sf, divide by 10,000

Structure footprint estimates are derived from this dataset: <https://www.sciencebase.gov/catalog/item/5e4320674060b47be4657> they were calculated for each parcel using the conal statistics as table tool (sum statistics) in ArcGIS and converted from square meters to square feet

Column I to end are sourced from 2019 NLCD Landcover Data: <https://www.mrlc.gov/datasets/nlcd-2019-landcover> cover codes they were calculated using the "tabulate area" tool in ArcGIS for each parcel and converted from square meters to square feet

Full ID	Property Name	Address	Owner	Parcel(s)	Acreage	Parcel(s) Sq. Ft.	Number of Parcels	Site Notes	Structure Footprint Sq. Ft.	Meters	Structure Footprint Sq. Feet	Structure Assess?	Non Structure Sq. Ft.	Open Water Sq Ft	Developed, Open Space Sq Ft
Adkins Park 22 Jon St. 17	Adkins Park	22 Jon St.	City of Metropolis	0.970	42,259	1			131		1,406	1	40,853	0.0	21,527.8
American Legion Park 1500 Metropolis St. 12	American Legion Park	1000 Metropolis St.	City of Metropolis	0.507	283,447	4	also ID NUMs 14 and 41		55		282,856	1		0.0	199,112.3
City Hall 106 West 5th St. 2	City Hall	106 West 5th St.	City of Metropolis	0.693	30,182	1			571		6,148	1	24,034	0.0	0.0
Ditch/Easement near 25 Adkins	Ditch/Easement	near 25 Adkins	City of Metropolis	0.211	9,180	1			156		1,684	1	7,496	0.0	6,484.3
Dorothy Miller Park 524 E 1st St. 26	Dorothy Miller Park	524 E 1st St.	City of Metropolis	4.707	205,033	6	also ID NUM 51 and 68		129		203,837	1	1,391	0.0	19,835.1
Empty lot 1401 Market 146	Empty lot	1401 Market	City of Metropolis	0.125	5,451	1			123		1,338	1	4,123	0.0	0.0
Fire Department 215 West 7th St. 5	Fire Department	215 West 7th St.	City of Metropolis	0.620	26,999	3			732		7,877	1	19,122	0.0	0.0
Girl Scout House 1230 7th St. 11	Girl Scout House	1230 7th St.	City of Metropolis	0.412	235,739	1			0		235,739	0		0.0	157,153.1
Hope Lighthouse 504 1st St. 25	Hope Lighthouse	504 1st St.	City of Metropolis	0.592	25,771	1			0		25,771	0		0.0	1,076.4
House/building/property (fairgrounds) 4476 Korte Road 166	House/building/property (fairgrounds)	4476 Korte Road	Massac County	68.459	2,982,071	1			13,637		146,785	15	2,835,286	184,062.9	822,362.7
House/building/property 1012 East 3rd St. 97	House/building/property	1012 East 3rd St.	City of Metropolis	0.220	9,589	1			166		1,790	1	7,799	0.0	0.0
House/building/property 103 Freleighysen 140	House/building/property	103 Freleighysen	City of Metropolis	0.139	6,071	1			0		6,071	1	0.0	0.0	1,076.4
House/building/property 105 Freleighysen 141	House/building/property	105 Freleighysen	City of Metropolis	0.132	5,739	1			1		15	1	5,724	0.0	3,229.2
House/building/property 107 Freleighysen 142	House/building/property	107 Freleighysen	City of Metropolis	0.143	6,207	1			17		186	1	6,021	0.0	4,305.6
House/building/property 112 East 21st St. 102	House/building/property	112 East 21st St.	City of Metropolis	0.147	6,394	1			69		746	1	5,649	0.0	0.0
House/building/property 121 Hope Lane 131	House/building/property	121 Hope Lane	City of Metropolis	0.660	28,754	2			44		475	1	28,279	0.0	25,833.4
House/building/property 130 Carter Drive 150	House/building/property	130 Carter Drive	City of Metropolis	0.443	19,290	1			91		981	1	18,309	0.0	6,458.3
House/building/property 1504 Filmore 139	House/building/property	1504 Filmore	City of Metropolis	0.249	10,842	1	also ID 164		147		1,586	1	9,256	0.0	7,334.7
House/building/property 200 Broadway 132	House/building/property	200 Broadway	City of Metropolis	0.216	9,391	1			0		9,391	0	0.0	0.0	0.0
House/building/property 201 Broadway 133	House/building/property	201 Broadway	City of Metropolis	0.409	17,794	2	also id 134		0		17,794	0	0.0	0.0	0.0
House/building/property 204 East 11 St. 100	House/building/property	204 East 11 St.	City of Metropolis	0.044	1,903	1			2		21	1	1,882	0.0	0.0
House/building/property 205 Market 145	House/building/property	205 Market	City of Metropolis	0.848	36,930	1			0		0	0	36,930	0.0	9,687.5
House/building/property 206 Filmore 137	House/building/property	206 Filmore	City of Metropolis	0.147	6,401	1			100		1,080	1	5,321	0.0	1,076.4
House/building/property 206 W. 3rd St. 110	House/building/property	206 W. 3rd St.	City of Metropolis	0.179	7,800	20			20		211	0	7,589	0.0	0.0
House/building/property 208 Filmore 138	House/building/property	208 Filmore	City of Metropolis	0.147	6,401	1			64		711	1	5,690	0.0	0.0
House/building/property 208 W. 3rd St. 111	House/building/property	208 W. 3rd St.	City of Metropolis	0.214	9,341	1			0		9,341	0	0.0	0.0	0.0
House/building/property 210 Filmore 143	House/building/property	210 Filmore	City of Metropolis	0.146	6,374	1			104		1,122	1	5,252	0.0	0.0
House/building/property 210 W. 3rd St. 112	House/building/property	210 W. 3rd St.	City of Metropolis	0.214	9,332	1			0		9,332	0	0.0	0.0	0.0
House/building/property 212 Broadway 135	House/building/property	212 Broadway	City of Metropolis	0.216	9,401	1			298		3,202	1	6,198	0.0	0.0
House/building/property 212 W. 3rd St. 113	House/building/property	212 W. 3rd St.	City of Metropolis	0.214	9,335	1			0		9,335	0	0.0	0.0	0.0
House/building/property 216 W. 3rd St. 114	House/building/property	216 W. 3rd St.	City of Metropolis	0.219	9,529	1			0		9,529	0	0.0	0.0	0.0
House/building/property 301 W. 2nd St. 105	House/building/property	301 W. 2nd St.	City of Metropolis	0.255	11,119	1			0		11,119	0	0.0	0.0	0.0
House/building/property 303 1/2 W. 2nd St.	House/building/property	303 1/2 W. 2nd St.	City of Metropolis	0.109	4,727	1			0		4,727	0	0.0	0.0	0.0
House/building/property 305 W. 2nd St.	House/building/property	305 W. 2nd St.	City of Metropolis	0.286	12,460	2			0		12,460	0	0.0	0.0	0.0
House/building/property 308 W. 3rd St. 115	House/building/property	308 W. 3rd St.	City of Metropolis	0.454	18,913	1			613		6,595	1	12,318	0.0	5,892.0
House/building/property 309 W. 2nd St. 108	House/building/property	309 W. 2nd St.	City of Metropolis	0.216	9,426	1			0		9,426	0	0.0	0.0	0.0
House/building/property 315 1/2 Butler 136	House/building/property	315 1/2 Butler	City of Metropolis	0.079	3,438	33			33		351	1	3,088	0.0	0.0
House/building/property 401 W. 8th St. 123	House/building/property	401 W. 8th St.	City of Metropolis	0.078	3,383	1			32		347	1	3,036	0.0	0.0
House/building/property 407 W. 8th St. 124	House/building/property	407 W. 8th St.	City of Metropolis	0.136	5,934	1			31		5,519	1	2,152.8	0.0	0.0
House/building/property 414 East 2nd Street 90	House/building/property	414 East 2nd Street	City of Metropolis	0.149	6,500	1			0		6,500	0	0.0	0.0	0.0
House/building/property 414 West 2nd St. 109	House/building/property	414 West 2nd St.	City of Metropolis	0.149	6,512	1			0		18,512	0	0.0	0.0	0.0
House/building/property 415 W. 8th St. 125	House/building/property	415 W. 8th St.	City of Metropolis	0.136	5,913	1			58		620	1	5,294	0.0	0.0
House/building/property 418 1/2 East 3rd St. 95	House/building/property	418 1/2 East 3rd St.	City of Metropolis	0.396	17,229	1			0		17,229	0	0.0	0.0	10,763.9
House/building/property 418 East 2nd Street 91	House/building/property	418 East 2nd Street	City of Metropolis	0.141	6,190	1			21		224	1	44,190	0.0	6,458.3
House/building/property 418 East 3rd St. 94	House/building/property	418 East 3rd St.	City of Metropolis	0.347	23,842	241			241		2,597	1	21,245	0.0	6,458.3
House/building/property 509 W. 6th St. 118	House/building/property	509 W. 6th St.	City of Metropolis	0.105	4,552	30			30		320	1	4,233	0.0	0.0
House/building/property 511 W. 6th St. 119	House/building/property	511 W. 6th St.	City of Metropolis	0.174	7,587	21	also ID 120		21		224	1	7,363	0.0	4,305.6
House/building/property 513 W. 6th St. 122	House/building/property	513 W. 6th St.	City of Metropolis	0.070	3,094	4	also ID 121		4		48	1	2,986	0.0	0.0
House/building/property 610 East 17th St. 101	House/building/property	610 East 17th St.	City of Metropolis	0.372	16,200	119			119		1,276	1	14,924	0.0	10,763.9
House/building/property 700 East 1st Street 69	House/building/property	700 East 1st Street	City of Metropolis	0.140	6,105	1			0		6,105	0	0.0	0.0	3,239.2
House/building/property 701 East 1st Street 70	House/building/property	701 East 1st Street	City of Metropolis	0.252	10,972	1			0		10,972	0	0.0	0.0	10,763.9
House/building/property 702 East 1st Street 71	House/building/property	702 East 1st Street	City of Metropolis	0.275	12,000	1			0		12,000	0	0.0	0.0	4,305.6
House/building/property 702 East 2nd St. 103	House/building/property	702 East 2nd St.	City of Metropolis	0.080	3,464	1			0		3,464	0	0.0	0.0	2,129.2
House/building/property 705 East 1st Street 72	House/building/property	705 East 1st Street	City of Metropolis	0.065	2,834	1			0		2,834	0	0.0	0.0	1,076.4
House/building/property 706 East 1st Street 73	House/building/property	706 East 1st Street	City of Metropolis	0.138	6,000	1			0		6,000	0	0.0	0.0	0.0
House/building/property 708 East 1st Street 74	House/building/property	708 East 1st Street	City of Metropolis	0.138	6,000	1			0		6,000	0	0.0	0.0	0.0
House/building/property 715 East 1st Street 75	House/building/property	715 East 1st Street	City of Metropolis	0.103	4,499	1			0		4,499	0	0.0	0.0	0.0
House/building/property 717 East 1st Street 76	House/building/property	717 East 1st Street	City of Metropolis	0.172	7,499	1			0		7,499	0	0.0	0.0	0.0
House/building/property 806 East 2nd Street 92	House/building/property	806 East 2nd Street	City of Metropolis	0.610	26,571	2			178		1,918	1	24,653	0.0	5,382.0
House/building/property 807 East 2nd Street 93	House/building/property	807 East 2nd Street	City of Metropolis	0.203	8,851	71			71		769	1	8,083	0.0	0.0
House/building/property 810 East 1st Street 77	House/building/property	810 East 1st Street	City of Metropolis	0.137	5,968	1			0		5,968	0	0.0	0.0	0.0
House/building/property 810 Market St. 148	House/building/property	810 Market St.	Massac County	0.365	15,892	1			212		2,284	1	13,608	0.0	0.0
House/building/property 812 East 1st Street 78	House/building/property	812 East 1st Street	City of Metropolis	0.137	5,968	1			0		5,968	0	2,152.8	0.0	0.0
House/building/property 814 East 1st Street 79	House/building/property	814 East 1st Street	City of Metropolis	0.137	5,968	1			0		5,968	0	2,152.8	0.0	0.0
House/building/property 9th & Ferry Alley 152	House/building/property	9th & Ferry Alley	City of Metropolis	0.103	4,501	1			19		206	1	4,295	0.0	0.0
Lincoln Park 1000 East 5th Street 49	Lincoln Park	1000 East 5th Street	City of Metropolis	2.703	117,726	1			103		1,108	0	116,618	0.0	19,375.0
Lindsey Park 300 Park Lane 20	Lindsey Park	300 Park Lane	City of Metropolis	0.452	19,707	1			81		869	1	18,839	0.0	9,687.5
Marshall Cruise Park 507 W 7th St. 28	Marshall Cruise Park	507 W 7th St.	City of Metropolis	0.410	17,856	2			0		17,856	0	0.0	0.0	4,305.6
Massac County Court House 1 Superman Square 167	Massac County Court House	1 Superman Square	Massac County	0.746	32,478	1			717		7,713	1	24,765	0.0	0.0
Massac County Highway Dept. 2738 North Ave. 165	Massac County Highway Dept.	2738 North Ave.	Massac County	32.326	1,408,141	1	also 170		6,214		66,884	7	1,341,257	0.0	468,230.1
Massac County Sheriff's Department 513 Market St. 171	Massac County Sheriff's Department	513 Market St.	Massac County	0.350	15,262	1			687		7,398	1	15,262	0.0	0.0
Memorial Park 305 Metropolis St. 21	Memorial Park	305 Metropolis St.	City of Metropolis	0.962	41,903	1	also ID NUM 23		497		5,352	1	36,552	0.0	0.0

Full ID	Property Name	DEVELOPED HARD SURFACE SQ FT	FOREST SQ FT	CROPS & PASTURE SQ FT	WETLANDS SQ FT	NON STRUCTURE GRASS, ETC SQ FT (Can be remediated)	Soil assess Units per 10000sf	NON STRUCTURE HARD SURFACE SQ FT (No Remediation)	NON STRUCTURE FOREST, WATER, WETLANDS SQ FT (No remediation)
Adkins Park 22 Jon St. 17	Adkins Park	19,375.0	0.0	0.0	0.0	21,527.8	1.0	19,375.0	0.0
American Legion Park 1500 Metropolis St. 12	American Legion Park	78,576.5	0.0	0.0	0.0	199,112.3	9.1	78,576.5	0.0
City Hall 108 West 5th St. 2	City Hall	27,986.2	0.0	0.0	0.0	0.0	0.0	27,986.2	0.0
Ditch/Easement near 25 Adkins 151	Ditch/Easement	4,305.6	0.0	0.0	0.0	6,458.3	1.0	4,305.6	0.0
Dorothy Miller Park 124 E 1st St. 26	Dorothy Miller Park	165,764.2	0.0	0.0	0.0	39,826.5	4.0	165,764.2	0.0
Empty lot 1601 Market 146	Empty lot	4,305.6	0.0	0.0	0.0	0.0	0.0	4,305.6	0.0
Fire Department 215 West 7th St. 5	Fire Department	25,833.4	0.0	0.0	0.0	0.0	0.0	25,833.4	0.0
Girl Scout House 1230 E 7th St. 11	Girl Scout House	79,652.9	0.0	0.0	0.0	157,151.1	7.2	79,652.9	0.0
Hope Lighthouse 504 1st St. 25	Hope Lighthouse	24,757.0	0.0	0.0	0.0	1,076.4	1.0	24,757.0	0.0
House/building/property (fairgrounds) 4476 Korte Road 166	House/building/property (fairgrounds)	883,717.0	532,813.5	146,389.2	414,410.5	968,751.9	44.5	883,717.0	1,131,286.9
House/building/property 1012 East 3rd St. 97	House/building/property	9,687.5	0.0	0.0	0.0	0.0	0.0	9,687.5	0.0
House/building/property 103 Frelinghuysen 140	House/building/property	5,382.0	0.0	0.0	0.0	1,076.4	1.0	5,382.0	0.0
House/building/property 105 Frelinghuysen 141	House/building/property	2,152.8	0.0	0.0	0.0	3,229.2	1.0	2,152.8	0.0
House/building/property 107 Frelinghuysen 142	House/building/property	2,152.8	0.0	0.0	0.0	4,305.6	1.0	2,152.8	0.0
House/building/property 112 East 2nd St. 100	House/building/property	8,611.1	0.0	0.0	0.0	0.0	0.0	8,611.1	0.0
House/building/property 121 Hope Lane 131	House/building/property	2,152.8	0.0	0.0	0.0	25,833.4	2.6	2,152.8	0.0
House/building/property 130 Carter Drive 150	House/building/property	12,916.7	0.0	0.0	0.0	6,458.3	1.0	12,916.7	0.0
House/building/property 1504 Filmore 139	House/building/property	4,305.6	0.0	0.0	0.0	7,534.7	1.0	4,305.6	0.0
House/building/property 200 Broadway 132	House/building/property	10,763.9	0.0	0.0	0.0	0.0	0.0	10,763.9	0.0
House/building/property 201 Broadway 133	House/building/property	18,298.6	0.0	0.0	0.0	0.0	0.0	18,298.6	0.0
House/building/property 204 East 11 St. 100	House/building/property	2,152.8	0.0	0.0	0.0	0.0	0.0	2,152.8	0.0
House/building/property 205 Market 145	House/building/property	26,909.8	0.0	0.0	0.0	9,687.5	1.0	26,909.8	0.0
House/building/property 206 Filmore 137	House/building/property	5,382.0	0.0	0.0	0.0	1,076.4	1.0	5,382.0	0.0
House/building/property 206 W. 3rd St. 110	House/building/property	7,534.7	0.0	0.0	0.0	0.0	0.0	7,534.7	0.0
House/building/property 208 Filmore 138	House/building/property	5,382.0	0.0	0.0	0.0	0.0	0.0	5,382.0	0.0
House/building/property 208 W. 3rd St. 111	House/building/property	9,687.5	0.0	0.0	0.0	0.0	0.0	9,687.5	0.0
House/building/property 210 Filmore 143	House/building/property	6,458.3	0.0	0.0	0.0	6,458.3	0.0	6,458.3	0.0
House/building/property 210 W. 3rd St. 112	House/building/property	9,687.5	0.0	0.0	0.0	0.0	0.0	9,687.5	0.0
House/building/property 212 Broadway 135	House/building/property	8,611.1	0.0	0.0	0.0	0.0	0.0	8,611.1	0.0
House/building/property 212 W. 3rd St. 113	House/building/property	9,687.5	0.0	0.0	0.0	9,687.5	0.0	9,687.5	0.0
House/building/property 216 W. 3rd St. 114	House/building/property	8,611.1	0.0	0.0	0.0	0.0	0.0	8,611.1	0.0
House/building/property 231 W. 2nd St. 105	House/building/property	10,763.9	0.0	0.0	0.0	0.0	0.0	10,763.9	0.0
House/building/property 302 12 W. 2nd St. 106	House/building/property	4,305.6	0.0	0.0	0.0	4,305.6	0.0	4,305.6	0.0
House/building/property 305 W. 2nd St. 107	House/building/property	11,840.3	0.0	0.0	0.0	0.0	0.0	11,840.3	0.0
House/building/property 308 W. 3rd St. 115	House/building/property	15,069.5	0.0	0.0	0.0	5,382.0	1.0	15,069.5	0.0
House/building/property 309 W. 2nd St. 108	House/building/property	8,611.1	0.0	0.0	0.0	0.0	0.0	8,611.1	0.0
House/building/property 315 1/2 Butler 136	House/building/property	3,229.2	0.0	0.0	0.0	0.0	0.0	3,229.2	0.0
House/building/property 401 W. 8th St. 123	House/building/property	3,229.2	0.0	0.0	0.0	0.0	0.0	3,229.2	0.0
House/building/property 407 W. 8th St. 124	House/building/property	2,229.2	0.0	0.0	0.0	2,152.8	1.0	3,229.2	0.0
House/building/property 414 East 2nd Street 90	House/building/property	7,534.7	0.0	0.0	0.0	0.0	0.0	7,534.7	0.0
House/building/property 415 West 2nd St. 109	House/building/property	17,222.3	0.0	0.0	0.0	0.0	0.0	17,222.3	0.0
House/building/property 415 W. 8th St. 125	House/building/property	6,458.3	0.0	0.0	0.0	0.0	0.0	6,458.3	0.0
House/building/property 418 1/2 East 3rd St. 95	House/building/property	5,382.0	0.0	0.0	0.0	10,763.9	2.0	5,382.0	0.0
House/building/property 418 East 3rd Street 91	House/building/property	39,520.9	0.0	0.0	0.0	4,458.3	1.0	39,520.9	0.0
House/building/property 418 East 3rd St. 94	House/building/property	17,222.3	0.0	0.0	0.0	6,458.3	1.0	17,222.3	0.0
House/building/property 509 W. 6th St. 118	House/building/property	4,305.6	0.0	0.0	0.0	0.0	0.0	4,305.6	0.0
House/building/property 511 W. 6th St. 119	House/building/property	4,305.6	0.0	0.0	0.0	4,305.6	1.0	4,305.6	0.0
House/building/property 513 W. 6th St. 122	House/building/property	3,229.2	0.0	0.0	0.0	0.0	0.0	3,229.2	0.0
House/building/property 630 East 17th St. 101	House/building/property	5,382.0	0.0	0.0	0.0	10,763.9	2.0	5,382.0	0.0
House/building/property 700 East 1st Street 69	House/building/property	4,305.6	0.0	0.0	0.0	3,229.2	1.0	4,305.6	0.0
House/building/property 701 East 1st Street 70	House/building/property	0.0	0.0	0.0	0.0	10,763.9	2.0	0.0	0.0
House/building/property 702 East 1st Street 71	House/building/property	6,458.3	0.0	0.0	0.0	4,305.6	1.0	6,458.3	0.0
House/building/property 702 East 2nd St. 103	House/building/property	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
House/building/property 705 East 1st Street 72	House/building/property	2,152.8	0.0	0.0	0.0	1,076.4	1.0	2,152.8	0.0
House/building/property 706 East 1st Street 73	House/building/property	6,458.3	0.0	0.0	0.0	0.0	0.0	6,458.3	0.0
House/building/property 708 East 1st Street 74	House/building/property	6,458.3	0.0	0.0	0.0	6,458.3	0.0	6,458.3	0.0
House/building/property 715 East 1st Street 75	House/building/property	4,305.6	0.0	0.0	0.0	0.0	0.0	4,305.6	0.0
House/building/property 717 East 1st Street 76	House/building/property	7,534.7	0.0	0.0	0.0	0.0	0.0	7,534.7	0.0
House/building/property 800 East 2nd Street 52	House/building/property	20,451.4	0.0	0.0	0.0	5,382.0	1.0	20,451.4	0.0
House/building/property 807 East 2nd Street 93	House/building/property	8,611.1	0.0	0.0	0.0	0.0	0.0	8,611.1	0.0
House/building/property 810 East 1st Street 77	House/building/property	5,382.0	0.0	0.0	0.0	0.0	0.0	5,382.0	0.0
House/building/property 810 Market St. 148	House/building/property	16,145.9	0.0	0.0	0.0	0.0	0.0	16,145.9	0.0
House/building/property 812 East 1st Street 78	House/building/property	4,305.6	0.0	0.0	0.0	2,152.8	1.0	4,305.6	0.0
House/building/property 814 East 1st Street 79	House/building/property	4,305.6	0.0	0.0	0.0	2,152.8	1.0	4,305.6	0.0
House/building/property 9th & Ferry Alley 152	House/building/property	4,305.6	0.0	0.0	0.0	4,305.6	0.0	4,305.6	0.0
Lincoln Park 1000 East 5th Street 49	Lincoln Park	99,028.0	0.0	0.0	0.0	19,375.0	2.0	99,028.0	0.0
Lindsey Park 300 Park Lane 20	Lindsey Park	9,687.5	0.0	0.0	0.0	9,687.5	0.0	9,687.5	0.0
Marshall Cruise Park 507 W 7th St. 28	Marshall Cruise Park	12,916.7	0.0	0.0	0.0	4,305.6	1.0	12,916.7	0.0
Massac County Court House 1 Superman Square 167	Massac County Court House	34,444.5	0.0	0.0	0.0	0.0	0.0	34,444.5	0.0
Massac County Highway Dept. 2736 North Ave. 165	Massac County Highway Dept.	573,716.4	39,826.5	328,299.3	0.0	796,529.3	36.6	573,716.4	39,826.5
Massac County Sheriff's Department 515 Market St. 171	Massac County Sheriff's Department	56,145.9	0.0	0.0	0.0	0.0	0.0	56,145.9	0.0
Memorial Park 305 Metropolis St. 21	Memorial Park	41,979.2	0.0	0.0	0.0	0.0	0.0	41,979.2	0.0
Metropolis Community Center 500 West 10th St. 3	Metropolis Community Center	38,750.1	0.0	0.0	0.0	0.0	0.0	38,750.1	0.0
Metropolis Municipal Airport 751 Airport Road 10	Metropolis Municipal Airport	1,541,391.9	90,416.8	4,525,147.8	0.0	7,987,721.6	311.6	1,541,391.9	90,416.8
Metropolis Public Works Facility 815 Johnson St. 1	Metropolis Public Works Facility	110,868.3	0.0	0.0	0.0	0.0	0.0	110,868.3	0.0
Metropolis Sports Park 2004 Metropolis St. 15	Metropolis Sports Park	821,286.3	375,660.5	1,482,190.4	0.0	2,209,830.7	101.5	821,286.3	375,660.5
Metropolis Swimming pool 312 W 4th St. 22	Metropolis Swimming pool	144,236.4	0.0	0.0	0.0	0.0	0.0	144,236.4	0.0
parking lot 1408 metropolis St. 147	parking lot	8,611.1	0.0	0.0	0.0	0.0	0.0	8,611.1	0.0
Parking lot 1409 Grand 144	Parking lot	12,916.7	0.0	0.0	0.0	0.0	0.0	12,916.7	0.0
Parking lot 1412 Metropolis St. 148	Parking lot	12,916.7	0.0	0.0	0.0	0.0	0.0	12,916.7	0.0
parking lot 604 Pearl St. 159	parking lot	18,298.6	0.0	0.0	0.0	0.0	0.0	18,298.6	0.0
PD (Happic benches) 106 West 5th St. 42	PD (Happic benches)	6,458.3	0.0	0.0	0.0	6,458.3	0.0	6,458.3	0.0
Police Department 1002 Broadway 4	Police Department	31,215.3	0.0	0.0	0.0	0.0	0.0	31,215.3	0.0
Public Restroom 113 West 7th St. 47	Public Restroom	8,611.1	0.0	0.0	0.0	0.0	0.0	8,611.1	0.0
Regional Office of Education 1102 W. 10th St. 169	Regional Office of Education	32,291.7	0.0	0.0	0.0	0.0	0.0	32,291.7	0.0
Senior Citizens Center 701 Market Street 58	Senior Citizens Center	4,305.6	0.0	0.0	0.0	4,305.6	0.0	4,305.6	0.0
South Substation 310 W. 3rd St. 29	South Substation	9,687.5	0.0	0.0	0.0	0.0	0.0	9,687.5	0.0
Transfer Station at Old Landfill, office Joppe Road & Mc Laird Road 63	Transfer Station at Old Landfill, office	916,008.7	565,105.3	0.0	0.0	567,258.1	26.0	916,008.7	565,105.3
Washington Park 300 Metropolis St. 19	Washington Park	484,376.0	9,687.5	0.0	0.0	18,298.6	1.0	484,376.0	9,687.5
Waste Water Plant 6218 Public Works Drive 7	Waste Water Plant	40,902.9	0.0	0.0	0.0	7,534.7	1.0	40,902.9	0.0
Water Filtration Plant 624 Public Works Drive 6	Water Filtration Plant	130,243.3	4,305.6	0.0	0.0	45,514.0	2.3	130,243.3	4,305.6
Water Tank 1037 North Avenue 60	Water Tank	7,534.7	0.0	0.0	0.0	0.0	0.0	7,534.7	0.0
Water Tower; Pump station Industrial Park Drive 61	Water Tower; Pump station	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

580.2 Total w Soil Assess Units

Direct Sampling Assessment Units
\$ 4,631,841.66 Soil Assess Units For parcels larger than 1-acre, divide of/acre*2; for parcel 10k ft to acre, divide by 10k of
\$ 1,278,613.40 Structure Assess Units For structure larger than 10k ft, divide by 10,000
\$ 5,910,455.06

Property Owner	Property Name	Address	Sample ID - Date Sample/Data Analysis/Notes
City of Metropolis	Metropolis Public Works Facility	825 Johnson St.	MET12802/ 9/21/2018 2/28/2019
City of Metropolis	City Hall	208 West 30th St.	MET02020/ 4/25/2018 1/27/2024
City of Metropolis	Metropolis Community Center	900 West 320th	N/A N/A N/A
City of Metropolis	Police Department	1500 Harrison St.	N/A N/A N/A
City of Metropolis	Fire Department	213 West 7th St.	N/A N/A N/A
City of Metropolis	Water Filtration Plant	634 S 23rd Street	MET08406 4/25/2020 1/27/2024
City of Metropolis	Waste Water Plant	6218 Public Works Drive	MET00355 4/25/2020 7/27/2028
City of Metropolis	Animal Control	730 Public Works Drive	N/A N/A N/A
City of Metropolis	Grand Warehouse	708 Main St.	N/A N/A N/A
City of Metropolis	Metropolis Municipal Airport	751 Airport Road	MET32020 1/13/2020 4/25/2020
City of Metropolis	Girl Scout House	1181 E 7th St.	
City of Metropolis	American Legion Park	1300 Metropolis St.	
City of Metropolis	Ashley Bryan Memorial Park	1804 Metropolis St.	
City of Metropolis	American Legion Park	1802 Metropolis St.	
City of Metropolis	Metropolis Sports Park	2004 Metropolis St.	
City of Metropolis	Metropolis Soccer Fields	2120 Metropolis St.	
City of Metropolis	Adams Park	221 3rd St.	
City of Metropolis	Metropolis Sports Park	2280 Metropolis St.	
City of Metropolis	Washington Park	300 Metropolis St.	
City of Metropolis	Leander Park	302 Park Lane	
City of Metropolis	Memorial Park	305 Metropolis St.	
City of Metropolis	Metropolis Swimming pool	312 W 4th St.	
City of Metropolis	Metropolis Public Library	313 Metropolis St.	
City of Metropolis	Franklin Park (swimming, bathhouse, update, well, and pump/house)	400 W 4th St.	
City of Metropolis	Hope Lighthouse	504 5th St.	
City of Metropolis	Dorothy Miller Park	534 E 1st St.	
City of Metropolis	Lafayette Adams Park	913 E 3rd St.	
City of Metropolis	Marshall Cresser Park	507 W 3rd St.	
City of Metropolis	South Substation	310 W 3rd St.	
City of Metropolis	Yasun In/Workfront	to be supplemented	
City of Metropolis	Supply	New Public Works Complex - Builders	
City of Metropolis	Building 6 of Builders Supply	9th St.	identified in insurance policy (Bates range chitycouny02393-024234)
City of Metropolis	Building 8 of Builders Supply	823 Johnson St.	identified in insurance policy (Bates range chitycouny02393-024234); cannot be sold - verify
City of Metropolis	Building 2 of Builders Supply	821 Johnson St.	identified in insurance policy (Bates range chitycouny02393-024234); cannot be sold - verify
City of Metropolis	Building 3 of Builders Supply	822 Johnson St.	identified in insurance policy (Bates range chitycouny02393-024234); cannot be sold - verify
City of Metropolis	Building 5 of Builders Supply	8th Street	identified in insurance policy (Bates range chitycouny02393-024234)
City of Metropolis	Building 3 of Builders Supply	821 2nd St.	identified in insurance policy (Bates range chitycouny02393-024234)
City of Metropolis	Building 4 of Builders Supply	8th Street	identified in insurance policy (Bates range chitycouny02393-024234)
City of Metropolis	Building 7 of Builders Supply	8th Street	identified in insurance policy (Bates range chitycouny02393-024234)
City of Metropolis	Building 4 of Builders Supply	821 Johnson Street	identified in insurance policy (Bates range chitycouny02393-024234)
City of Metropolis	American Legion Park Concession, P/O		
City of Metropolis	Amusement, stadium lighting, bleachers, Pressbox/Concession, Restrooms/Thronging		
City of Metropolis	1st Base Outpost, 1st Base Outpost	1700 Metropolis St	identified in insurance policy (Bates range chitycouny02393-024234); City does not own but must insure
City of Metropolis	PO (Baggage, benches)	106 West 5th St.	identified in insurance policy (Bates range chitycouny02393-024234); City does not own but must insure
City of Metropolis	Woodhaven Life Station	Highway 54	identified in insurance policy (Bates range chitycouny02393-024234); City does not own but must insure
City of Metropolis	Girl Scout Life Station	7th St. & Route 45	identified in insurance policy (Bates range chitycouny02393-024234)
City of Metropolis	Industrial Park Life Station #1	Industrial Park/Quincy Road	identified in insurance policy (Bates range chitycouny02393-024234)
City of Metropolis	Route 45 Life Station	Route 45	identified in insurance policy (Bates range chitycouny02393-024234)
City of Metropolis	Public Lincoln	113 West 7th St.	identified in insurance policy (Bates range chitycouny02393-024234)
City of Metropolis	Electric Supplies Storage	142 West 7th	identified in insurance policy (Bates range chitycouny02393-024234)
City of Metropolis	Reservoir	1000 East 5th Street	identified in insurance policy (Bates range chitycouny02393-024234)
City of Metropolis	Chicago Gasbois & P/O	304 Park St.	identified in insurance policy (Bates range chitycouny02393-024234)
City of Metropolis	Dorothy Miller Park	533 East Front St.	identified in insurance policy (Bates range chitycouny02393-024234)
City of Metropolis	Airport	2 Airport Road	identified in insurance policy (Bates range chitycouny02393-024234)
City of Metropolis	Maintenance Office/Garage	735 East 12th St.	identified in insurance policy (Bates range chitycouny02393-024234)
City of Metropolis	Park & Building	2280 Metropolis Street	identified in insurance policy (Bates range chitycouny02393-024234)
City of Metropolis	South Substation	312 W 3rd St.	identified in insurance policy (Bates range chitycouny02393-024234)
City of Metropolis	East 28th Street	East 28th Street	identified in insurance policy (Bates range chitycouny02393-024234)
City of Metropolis	Public Works Building	733 Public Works Drive	identified in insurance policy (Bates range chitycouny02393-024234)
City of Metropolis	Senior Citizens Center	701 Market Street	identified in insurance policy (Bates range chitycouny02393-024234); Leased per insurance policy
City of Metropolis	Wall lot	383 Vienna Street	identified in insurance policy (Bates range chitycouny02393-024234)
City of Metropolis	Water Tank	1017 North Avenue	identified in insurance policy (Bates range chitycouny02393-024234)
City of Metropolis	Water Tower, Pump station	Industrial Park Drive	identified in insurance policy (Bates range chitycouny02393-024234); Leased per insurance policy
City of Metropolis	Residence	2402 Drovers Road	identified in insurance policy (Bates range chitycouny02393-024234); Leased per insurance policy
City of Metropolis	Transfer Station at Old Landfill, office	Joppe Road & McLeod Road	identified in insurance policy (Bates range chitycouny02393-024234); verify ownership
City of Metropolis	WWTP Office and buildings	618 Public Works Drive	identified in insurance policy (Bates range chitycouny02393-024234); verify ownership
City of Metropolis	WWTP - Office and buildings	634 Public Works Drive	identified in insurance policy (Bates range chitycouny02393-024234)
City of Metropolis	Street Hockey Court	not provided	identified in insurance policy (Bates range chitycouny02393-024234)
City of Metropolis	Park - retirement and storage building	210 West 7th St.	identified in insurance policy (Bates range chitycouny02393-024234)
City of Metropolis	House/building/property	634 East 3rd Street	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	700 East 3rd Street	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	701 East 3rd Street	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	701 East 3rd Street	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	700 East 3rd Street	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	700 East 3rd Street	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	700 East 3rd Street	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	717 East 3rd Street	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	810 East 3rd Street	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	812 East 3rd Street	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	834 East 3rd Street	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	300 East 2nd Street	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	304 East 2nd street	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	304 East 2nd Street	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	310 East 2nd Street	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	312 East 2nd Street	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	314 East 2nd Street	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	404 East 2nd Street	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	408 East 2nd Street	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	410 East 2nd Street	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	412 East 2nd Street	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	424 East 2nd Street	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	425 East 2nd Street	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	800 East 2nd Street	identified in mow list CITYCOUNTY024235-024239; FEMA property
City of Metropolis	House/building/property	807 East 2nd Street	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	438 East 3rd St.	identified in mow list CITYCOUNTY024235-024239; FEMA property
City of Metropolis	House/building/property	438 E 3rd East 3rd St.	identified in mow list CITYCOUNTY024235-024239; FEMA property
City of Metropolis	House/building/property	600 East 3rd St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	1017 East 3rd St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	811 East 6th St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	1021 East 7th St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	204 East 11 St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	810 East 17th St.	identified in mow list CITYCOUNTY024235-024239; FEMA property
City of Metropolis	House/building/property	112 East 21st St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	702 East 2nd St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	111 W. 2nd St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	301 W. 2nd St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	301 E 2nd, 2nd St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	300 W. 2nd St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	300 W. 2nd St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	404 West 2nd St.	identified in mow list CITYCOUNTY024235-024239; FEMA property
City of Metropolis	House/building/property	208 W. 3rd St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	212 W. 3rd St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	214 W. 3rd St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	308 W. 3rd St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	314 W. 3rd St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	314 W. 4th St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	509 W. 4th St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	511 W. 4th St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	509 W. 4th St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	511 W. 4th St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	513 W. 4th St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	401 W. 4th St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	407 W. 4th St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	412 W. 4th St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	508 W. 8th St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	407 W. 12th St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	412 W. 12th St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	412 W. 12th St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	412 W. 12th St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	201 Broadway	identified in mow list CITYCOUNTY024235-024239; FEMA property
City of Metropolis	House/building/property	201 Broadway	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	212 Broadway	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	115 121 Butler	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	208 Florence	identified in mow list CITYCOUNTY024235-024239; FEMA property
City of Metropolis	House/building/property	208 Florence	identified in mow list CITYCOUNTY024235-024239; FEMA property
City of Metropolis	House/building/property	1304 Florence	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	103 Frothingham	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	103 Frothingham	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	107 Frothingham	identified in mow list CITYCOUNTY024235-024239; FEMA property
City of Metropolis	Empty lot	814 Grand	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	Parking lot	1400 Grand	identified in mow list CITYCOUNTY024235-024239; cannot be sold
City of Metropolis	Empty lot	203 Market	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	Parking lot	1400 Metropolis St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	Parking lot	1412 Metropolis St.	identified in mow list CITYCOUNTY024235-024239; cannot be sold
City of Metropolis	Empty lot	803 Paul St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	130 Carter Drive	identified in mow list CITYCOUNTY024235-024239; FEMA property
City of Metropolis	City/Town Center	west 25 & Adams	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	3rd St, Frank Marberry	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	Triangle	West 18th	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	Triangle	North Avenue and 12th Street	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	Mad Creek	Mad Creek Metropolis St. Through Linkway Park	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	sewer	8th Street near R/P parking lot	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	Triangle	Hillman	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	House/building/property	west 10th behind D & D	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	parking lot	604 Paul St.	identified in mow list CITYCOUNTY024235-024239
City of Metropolis	parking lot	604 Paul St.	identified in mow list CITYCOUNTY024235-024239; cannot be sold
City of Metropolis	Public Works (Old Builders Supply)	910 Johnson Street	identified in mow list CITYCOUNTY024235-024239; cannot be sold
City of Metropolis	House/building/property	8th & Perry Ferry	identified in mow list CITYCOUNTY024235-024239; cannot be sold
City of Metropolis	House/building/property	210 Florence	identified in mow list CITYCOUNTY024235-024239; cannot be sold
City of Metropolis	House/building/property	1504 Florence	identified in mow list CITYCOUNTY024235-024239; cannot be sold

Sutolaka

Total Assets FIRST ORDER ESTIMATE

Massac County	Massac County Highway Dept.	2736 North Ave.	identified in CITYCOUNTY003947 - 003951
Massac County	House/building/property (Burgomasters)	4476 Karna Road	identified in CITYCOUNTY003947 - 003951
Massac County	Massac County Court House	1 Superior Court Square	identified in CITYCOUNTY003947 - 003951
Massac County	House/building/property	810 Market St.	identified in CITYCOUNTY003947 - 003951; currently leased to business owner, may be building in town
Massac County	Regional Office of Education	1802 W. 20th St.	identified in CITYCOUNTY003947 - 003951; formerly leased to regional office of business, now building is vacant due to roof leaks and mold
Massac County	Massac County Fire Department	2734 North Ave.	Massac Regional educational office now relocated and being leased by Co. 10 statement not provided with lease information, address, and owner
Massac County	Massac County Sheriff's Department	511 Market St.	identified in CITYCOUNTY003947 - 003951

ANALYT E	METHOD	UNIT PRICE*	REMARKS	Eberline Quotation 9/7/2023
Gamma Spectroscopy	EPA 901.1 Mod	\$ 85.00	Report Ac228, Bi214, Co60, Cs134/137, Pa234m, Pb212/214, Tl208, Th234 & TRUE positives	28 Day TAT, Level IV, CLP Like Analytical Data Package with Excel EDD
Radium-226	EPA 903.0 Mod	\$ 75.00		
Radium-228	EPA 904.0	\$ 75.00		
Lead-210	EML Pb-01 Mod	\$ 100.00		
Isotopic Plutonium	EML Pu-02 Mod	\$ 100.00	Pu-238, Pu-239/240	
Technetium	EiChroM Tc-01 Mod	\$ 100.00		
Isotopic Thorium	EPA 907.0 Mod	\$ 100.00	Th-227, Th-228, Th-230, Th-232	
Isotopic Uranium	EPA 908.0 Mod	\$ 100.00	U-234, U-235, U-238	
		\$ 735.00	Total per sample	
Scanning Electron Microscopy (SEM)		\$ 400.00	MicroVision quotation 9/18/2023	

Test Description	Price	ALS QUOTE # 2424 / - SOIL Chemical Description
Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures - ASTM D2216	\$ 20.00	
Particle-Size Analysis of Soils - ASTM D422	\$ 175.00	
Liquid Limit, Plastic Limit, and Plasticity Index of Soils - ASTM D4318	\$ 85.00	
Bulk Density - ASTM E875-82(2006)	\$ 75.00	
* Hydraulic Permeability - D5084	\$ 425.50	
Particle Density - ASTM D854	\$ 65.00	
Cost/work order sustain fee	\$ 50.00	
	\$ 895.50	

Task A. - Assessment Sampling

Task - Interior dust wipe assessment sampling (Per Structure*)	Unit	Quantity	Rate	Sub-total	Total
Wipes for Metropolis COCs (28D TAT) w QA/QC	Structure	14	735.00	\$11,833.50	Eberline price quotation 9.7.2023. 28 Day TAT, Level IV, CLP Like Analytical Data Package with Excel EDO
Bulk Dust for Metropolis COCs (28D TAT) w QA/QC	Structure	1	735.00	\$845.25	
SEM analysis (Bulk Dust, surface dust lift)	Structure	2.0	400.00	\$920.00	
Expendibles - sample media, gloves, wipes, waste container	Structure	1	27.50	\$31.63	MicroVision price quotation 9.18.2023
PPE - Level C (Work clothes, work boots, hardhat, safety glasses, gloves, over boots, one (1) polycoated tyvek suit, one (1) full face respirator, one (1) pair of resp. cart	Day	1	145	\$166.75	
Radiation Meter (alpha, beta, gamma) Ludlum	Day	1	140	\$161.00	
Personal Air Monitor/Rad. Badge	Day	1	165	\$189.75	EWM 2023 Rate Sheet FEI Rental - Victoreen 990 w/ pan probe, or equivalent FEI Rental- TSI SidePak or equivalent
Service Vehicle/fuel	Day	1	175	\$175.00	
Sample Collection (inc. travel/handling) - trained tech w/ PPE	Staff Tech	6	85	\$510	
Sample Collection (inc. travel/handling) - trained tech w/ PPE	Staff Tech	6	85	\$510	\$15,342.88
Task - Surface soil site assessment sampling (per 5,000-10,000 sf)					
Surface soil for Metropolis COCs (28D TAT) w QA/QC	Property	7	735.00	\$5,916.75	Eberline price quotation 9.7.2023. 28 Day TAT, Level IV, CLP Like Analytical Data Package with Excel EDO
Expendibles/shipping	Property	1	15.00	\$17.25	
Expendibles - sample media, gloves, wipes, waste container	Property	1	27.50	\$31.63	
PPE - Level C (Work clothes, work boots, hardhat, safety glasses, gloves, over boots, one (1) polycoated tyvek suit, one (1) full face respirator, one (1) pair of resp. cart	Day	1	145	\$166.75	FEI Rental - Victoreen 990 w/ pan probe, or equivalent FEI Rental- TSI SidePak or equivalent FEI Rental - \$175/day Geo 7x; \$90/day antennae
Radiation Meter (alpha, beta, gamma) Ludlum	Day	1	140	\$161.00	
Personal Air Monitor/Rad. Badge	Day	1	165	\$189.75	
GPS- Trimble	Day	1	265	\$304.75	
Service Vehicle	Day	1	175	\$175.00	
Sample Collection (inc. travel/handling)	Staff Tech	6	85	\$510	
Sample Collection (inc. travel/handling)	Staff Tech	6	85	\$510	\$7,982.88
				Total/Property	\$23,325.75

Notes:

Estimate calculated as 15% markup of subcontracted services, expendible supplies, and rental equipment
Field sampling technicians must receive, at a minimum, orientation to the project's purpose, scope, and methods of implementation. This orientation is the responsibility of the Project Manager or designee.
Any field team members involved with sample collection or handling will have received 40-hour hazardous waste operations and emergency response (HAZWOPER – 29 CFR 1910.120) training and OSHA employer respiratory protection program (29 CFR 1910.134), training for lead sampling for use in HUD lead risk assessments

Interior Dust eligibility sampling

- 14 Total estimated number of dust samples per property
- 12 Wipe Samples/structure
 - Minumum based on HUD guidelines: (1)floor child play area not bedroom, (1)kitchen floor, (1)bedroom floor youngest child, (1)bedroom floor next oldest child; (2) discretionary sample child touch surface.
 - Also, (4) discretionary samples from attic, basement, or other areas that may serve as interior dust reservoir(s) that may recontaminate interior areas
- 2 Dust wipe QA/QC 2 field blank/structure.
- 1 Estimated average of one bulk dust sample/per property, if available, for sample collection (Note: some structures may not have sufficient quantity of collectible bulk dust, others may have more)
- Duplicates not used to evaluate wipe sampling

Exterior Soil Eligibility Sampling

- 5-point composite samples based on:
- 7 Total estimated number of soil and QA/QC samples per property (See criteria below as not all properties are the same dimension)
 - Composite Aliquots will be collected in a five dice configuration (each of the four corners and the center).
 - (2) discretionary grab samples from drip line and low-lying areas most likely to be affected by settled particulate contamination
 - Properties less or equal 5,000 sf (1) FY, (1) BY; (1) additional sample if distance andsubstantial side yard (SY)
 - Properties greater than 5,000 sf (1) FY, (1) BY; (1) additional sample per additional quarter acre
 - 5 Estimated average number sample per property
 - 1 Duplicate per 2 properties or 0.5/property
 - 1 MS/MSD per 2 properties or 0.5/property